United States Department of Agriculture

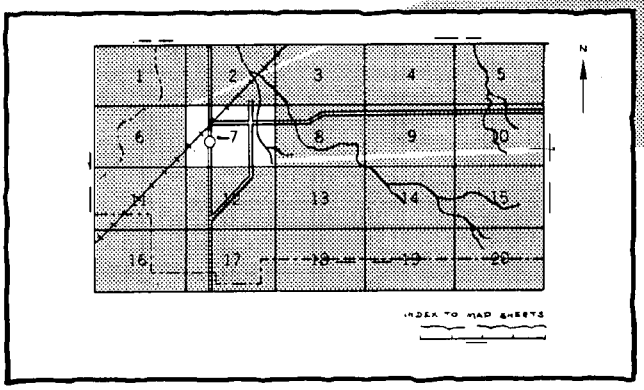
Soil Conservation Service

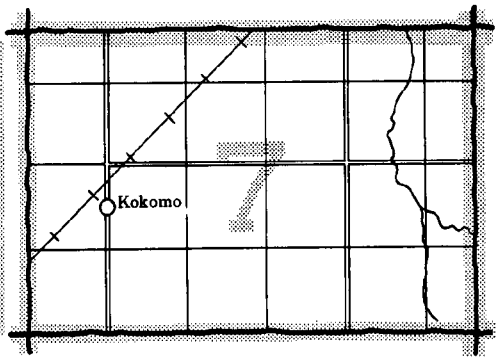
In Cooperation with Forest Service; and the Missouri Agricultural Experiment Station

Soil Survey of Butler County and Part of Ripley County Missouri

HOW TO USE

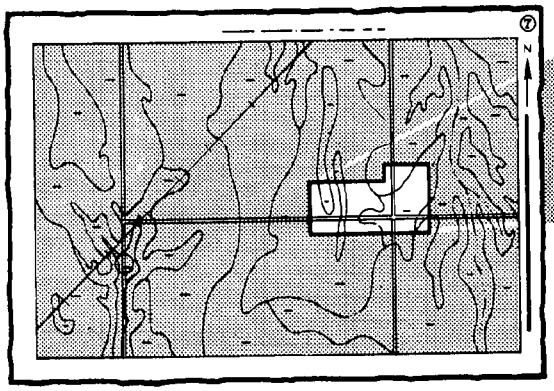
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

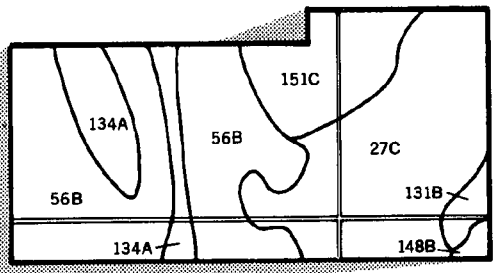




2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





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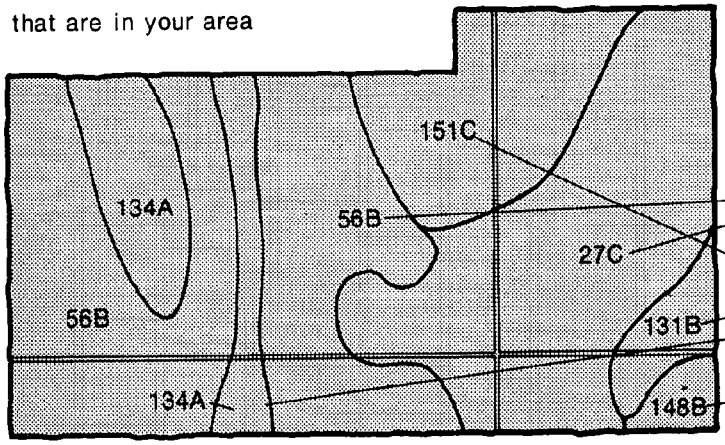
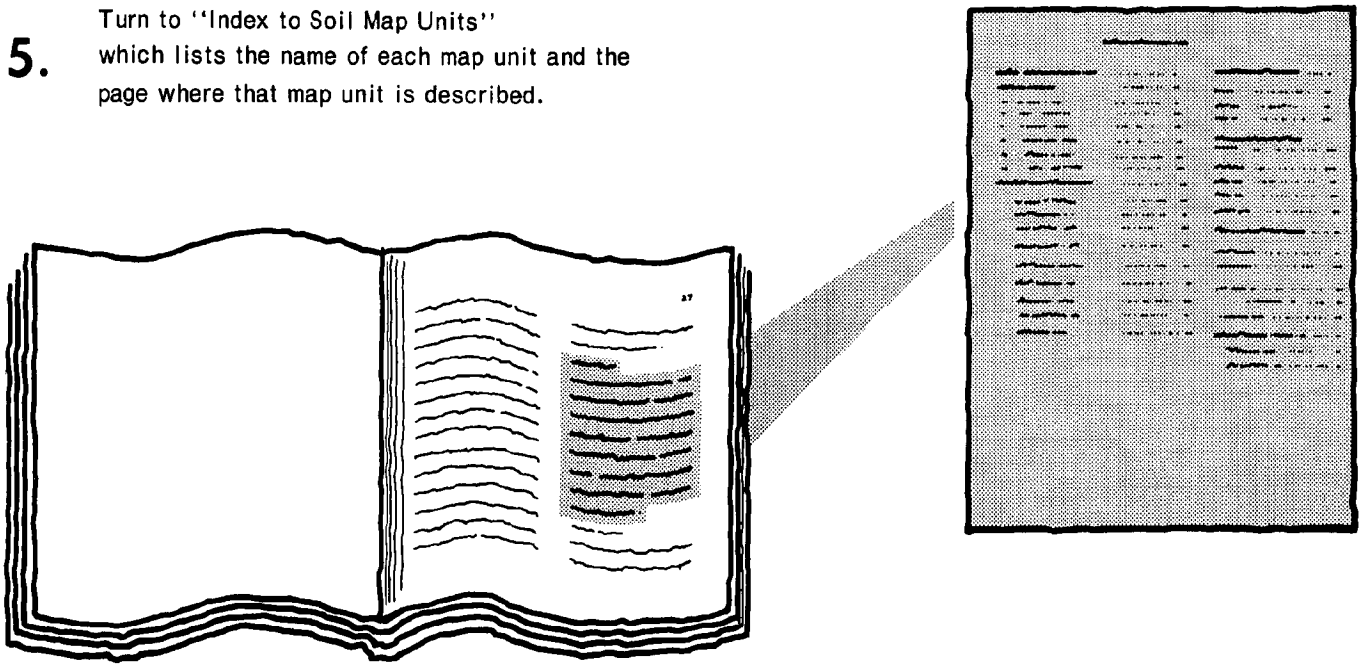


Symbols

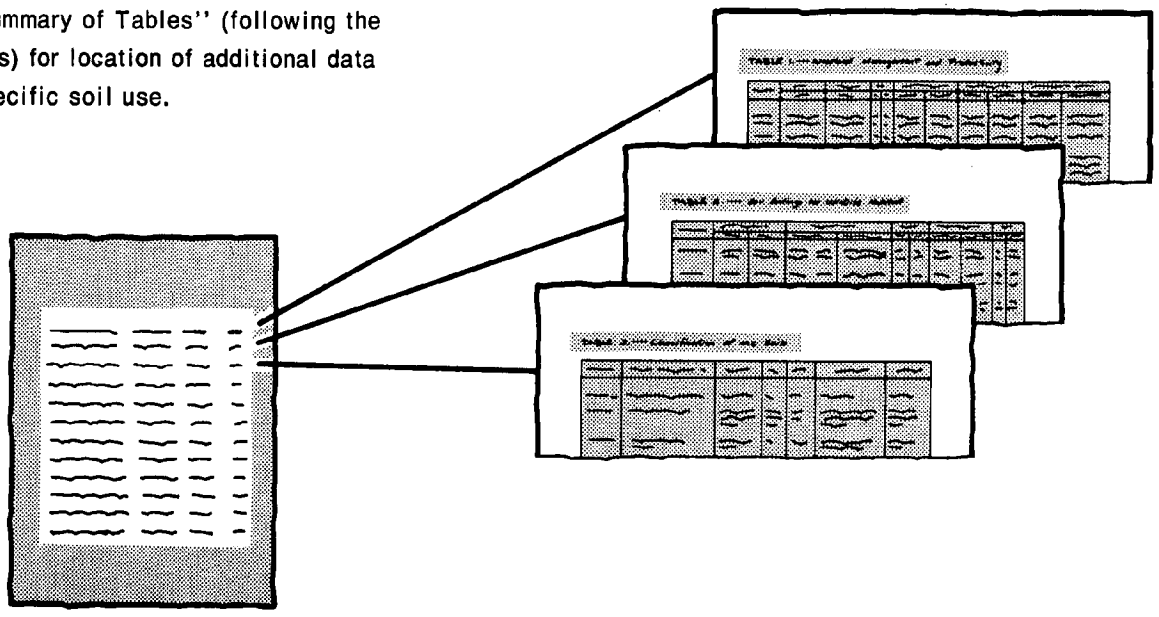
- 27C
- 56B
- 131B
- 134A
- 148B
- 151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Missouri Agricultural Experiment Station, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1966-81. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the Missouri Agricultural Experiment Station. It is part of the technical assistance furnished to the Butler County Soil and Water Conservation District and the Ripley County Soil and Water Conservation District.

Cover: Cropland on Calhoun silt loam.

contents

soil series

Issued November 1983

index to map units

Summary of tables

Foreword

This soil survey contains information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Paul F. Larson
State Conservationist
Soil Conservation Service

soil survey of
Butler County and part of Ripley County, Missouri

by Lewis H. Graves, Jr., Soil Conservation Service

fieldwork by Lewis H. Graves, Jr., John L. Baker, E. Rex Butler, Phill D. Gurley, M. Kent Palmer, Raleigh L. Redman, and M. G. Wilbur, Soil Conservation Service

United States Department of Agriculture
Soil Conservation Service and Forest Service,
in cooperation with
Missouri Agricultural Experiment Station

BUTLER AND RIPLEY COUNTIES are in the southeastern part of Missouri (fig. 1). The counties border Arkansas on the south. They make up an area of about 1,355 square miles or 867,200 acres. Poplar Bluff, the county seat of Butler County, has a population of about 25,000. Doniphan, the county seat of Ripley County, has a population of about 1,850.

The first soil survey of Ripley County was published by the United States Department of Agriculture in 1915 (*7*). In 1975, 133,010 acres of Ripley County was updated and published in the Mark Twain National Forest Survey. This acreage is not included in the present survey. The present survey updates the remaining acres of the 1915 survey, provides a detailed soil survey on aerial photography, and contains more interpretation information.

Butler County and that part of Ripley County within the survey area are about two-thirds Ozark upland and one-third Mississippi River flood plain. A large part of the upland is highly dissected and has steep, cherty soils on the side slopes. Sloping loess soils are adjacent to the old Mississippi River flood plain. The old Mississippi River flood plain has old channels, bayous, and natural levees formed by streams that have since disappeared. Elevation ranges from about 300 feet in the southern part of the survey area to about 800 feet in the northeastern part of the survey area.

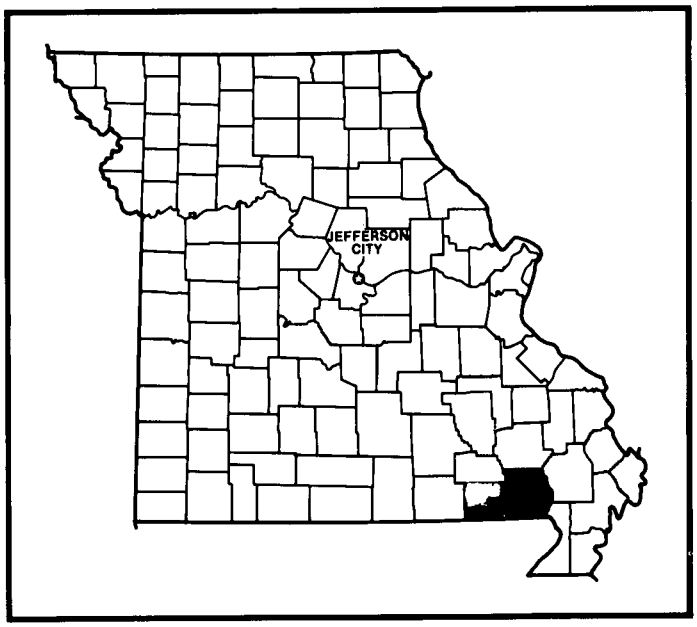


Figure 1. Location of Butler County and part of Ripley County in Missouri.

Farming is the main industry. Cash crops, beef cattle, feeder pigs, and timber are the major sources of farm

income (*15*). Crops include soybeans, grain sorghum, wheat, rice, corn, and watermelons.

general nature of the survey area

This section gives general information concerning the counties. It describes climate, history and development, natural resources, relief and drainage, and farming.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

The consistent pattern of climate in the Butler and Ripley County survey area is one of cold winters and long, hot summers. Heavy rains occur mainly in spring and early in summer when moist air from the Gulf of Mexico interacts with drier, continental air. The annual rainfall is normally adequate for corn, soybeans, and all grain crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Poplar Bluff in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 37 degrees F, and the average daily minimum temperature is 27 degrees. The lowest temperature on record, which occurred at Poplar Bluff on February 2, 1951, is -18 degrees. In summer the average temperature is 76 degrees, and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on July 27, 1952, is 108 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 24 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 6.6 inches at Poplar Bluff on March 28, 1977. Thunderstorms occur on about 50 days each year, and most occur in summer.

The average seasonal snowfall is 10 inches. The greatest snow depth at any one time during the period of record was 7 inches. On the average, only 1 day has at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in spring.

Tornadoes and severe thunderstorms occur occasionally but are local and of short duration. Damage varies and is spotty. Hailstorms occur at times during the warmer part of the year but in an irregular pattern and in only small areas.

history and development

Indians of various tribes were the inhabitants when the first settlers arrived in the area that later became Butler and Ripley Counties. Hernando De Soto and his party, who explored the area in the 1540's, were probably the first Europeans to arrive. At that time the counties were heavily forested.

Before the settlers, the area now known as Butler and Ripley Counties was one of the great hunting grounds of Indians and early French trappers. For many years after cultivation of the soil, Indians lived in camps along the major streams.

The early settlers came from Kentucky, Tennessee, North and South Carolina, Illinois, and Indiana (*4*). Early settlements at Cane Creek in Butler County and Doniphan in Ripley County were established about 1819. Poplar Bluff was established in the period between 1840-1860 (*5*). Ripley County was organized in 1833, and Butler County was organized in 1849. Both counties were organized from territory known as Wayne County.

Early residents used the waterways for much of their transportation. Travel across the wet areas in the southeastern part of the survey area was difficult, and this difficulty restricted trade to the east and along the Mississippi River. Early roads generally followed ridges of high ground, which provided a more durable and versatile means of passage than the wet areas (*5*).

After the old Mississippi River flood plain part of the survey area was drained, timber was more easily harvested, and clearing land for farming became more feasible. Railroads were constructed to transport timber and other crops from the area, and railroad construction quickly reached a peak, culminating in many miles of track. Today, however, the railroads are steadily decreasing in length and number.

Transportation is presently provided by the railroads, U. S. Highways 60, 67, and 160, and by state and county roads.

natural resources

Soil is the most important natural resource in the survey area. Many products are derived from the soil. Crops, livestock, wood, fruits, vegetables, honey, and fibers are produced on farms and marketed. In addition, the counties use soil material, such as topsoil, sand, and gravel.

The abundant water supply in the old Mississippi River flood plain is a very important resource. Irrigation wells, which are located throughout this area, produce from 500 to more than 3,000 gallons per minute. Wells range from 15 to 120 feet deep. The pH of these wells is about 7.0 to 8.0, and generally the water is high in calcium and magnesium carbonates.

Domestic water wells need to be dug deeper than irrigation wells in order to obtain better quality water. Water from the upper layers of the alluvium in the old Mississippi River flood plain usually has more iron than water obtained from the underlying geological strata. Locally organized water districts furnish water to large areas in both counties. In areas other than the old Mississippi flood plain, deep wells are mainly used as sources of water for domestic use.

Most soils of the uplands are suitable for the construction of ponds and small lakes to provide water for livestock.

relief and drainage

The survey area includes several major physiographic regions. The northeastern part of the survey area is steep, dissected areas of dominantly residual soils. The upland adjacent to the old flood plain of the Mississippi River is a sloping area of loess covered residuum. Along the major streams of the survey area are recent alluvial deposits. The southeastern part of the survey area is dominantly alluvial terraces of the old Mississippi River flood plain. Bedrock from the Ordovician period is exposed to soil forming processes in the northwestern part of the survey area.

Drainage in the survey area generally is southward. In the southeastern part of the survey area, drainage is through a system of natural and improved drainageways and connecting artificial channels. The survey area is well supplied with drainageways. The major natural drains are the St. Francis, Black, Little Black, and Current Rivers.

Many streams and lakes, such as Wappapello, Lockloma, and Beaver Dam furnish an abundant supply of surface water for recreation, farming, and industry.

farming

Farming in Butler and Ripley Counties covers an area from the natural levees of the old Mississippi River flood plain in the southeastern corner of the survey area to the higher, better drained areas of the upland. The early settlers raised crops mainly for home consumption. In addition, they hunted buffalo, deer, turkey, and raccoon and gathered wild fruits, nuts, and berries. As logging and clearing continued, however, more and more areas were farmed for income.

In 1980, according to Missouri Farm Facts, about 259,430 acres, or 36 percent of the survey area, was used for major crops. At present, soybeans is the main crop and about 138,000 acres are harvested annually. About 50,000 acres of sorghum and about 23,000 acres of rice also are harvested annually. Butler County is the major rice producing county in Missouri. The remaining crop acreage is used for corn, wheat, hay, and watermelons.

The number of livestock in the survey area has remained constant for the last several years. According to the 1980 Missouri Farm Facts, about 38,000 cows and calves and 22,000 hogs are raised in the survey area.

Because most farms are small, the family does most of its own work. Outside labor is employed only during peak seasons. On the larger farms, however, laborers are hired and supervised by the owner, manager, or tenant. Tenants pay a fixed rent or percentage of the crop for use of the land. Much of the land is farmed by operators who own enough modern equipment to manage the larger farms efficiently. Most farmers fertilize according to the needs of the crop, and many use chemicals for weed control.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists.

For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas called soil associations that have a distinctive pattern of soils, relief, and drainage. Each soil association on the general soil map is a unique natural landscape. Typically, a soil association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in other associations but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one soil association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent areas. Differences are the result of better knowledge of soils, modifications in series concepts, the map scale used, or the extent of soils in the survey.

Descriptions of the soil associations follow.

1. Doniphan-Captina association

Gently sloping to steep, well drained and moderately well drained, very cherty and silty soils; on uplands

This association is characterized by partly wooded, narrow ridges and steep side slopes. The side slopes are somewhat benched and dissected by narrow drainageways. In some places, the side slopes are adjacent to major streams that drain the areas (fig. 2).

This association makes up about 12 percent of the survey area. It is about 73 percent Doniphan soils and about 11 percent Captina soils. The remaining 16 percent is soils of minor extent.

The well drained, gently sloping to steep Doniphan soils are on narrow ridges and side slopes. They have a surface layer of dark grayish brown very cherty silt loam. The subsurface layer is light yellowish brown very cherty silt loam. The upper part of the subsoil is yellowish red cherty silty clay loam, and the lower part is red and brownish yellow, mottled clay.

The moderately well drained, gently sloping and moderately sloping Captina soils are on the lower part of side slopes and on foot slopes. They have a surface layer of dark grayish brown silt loam. The subsurface layer is pale brown silt loam. The upper part of the subsoil is strong brown and light yellowish brown, mottled silty clay loam; the next part is a fragipan of light yellowish brown, mottled, firm and brittle very cherty silty clay loam; the subsoil below the fragipan is strong brown, mottled cherty silty clay loam and red very cherty clay.

Of minor extent in this association are somewhat excessively drained Midco soils and well drained Elk and Nolin soils on bottom lands. Also included are moderately deep Gatewood and Bardley soils and shallow Gasconade soils on narrow ridges and side slopes and Wilderness soils on ridgetops. Wilderness soils have a fragipan and are cherty throughout.

About 50 percent of this association has been cleared. Most of the cleared areas are in pasture. Several acreages are used for wheat, and a few acreages are used for cultivated crops. These acreages are on foot slopes and on the bottom land. The uncleared acreage is mostly on steeper hillsides. These areas are in mixed hardwoods. Raising beef cattle and feeder pigs and the production of timber are the main enterprises.

Some of the soils in this association are suited to wheat and pasture, and some of the soils are suited to row crops. Erosion is the main concern of management in areas that are cultivated.

Droughtiness and maintaining fertility are the main concerns of management in areas that are used for pasture. Overgrazing is an additional concern of pasture management.

The soils in this association are suitable for tree production. Native trees are oak and pine. The steeper slopes of the Doniphan soils restrict the use of logging equipment. Erosion is a hazard along logging roads and skid trails. Seedling mortality is moderate on Captina soils and on the steeper areas of Doniphan soils.

Most of the soils in this association are suitable for building site development and sanitary facilities. However, slope, moderate permeability, and shrink-swell potential are limitations for the Doniphan soils, and slope, slow permeability, and wetness are limitations for the Captina soils. These limitations are moderate or severe. Both soils have only slight limitations on the more gently sloping areas.

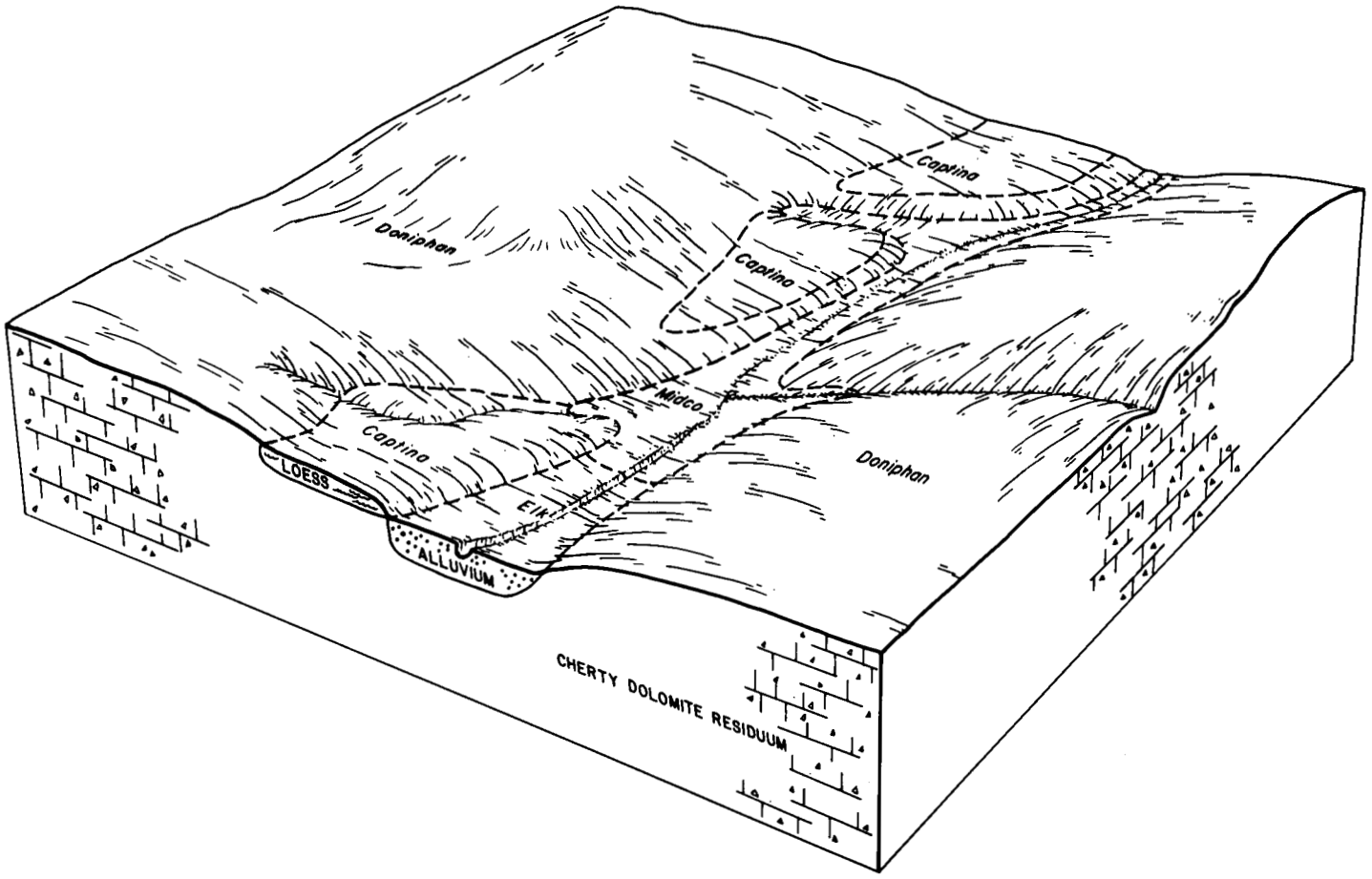


Figure 2. Typical pattern of soils and parent material in the Doniphan-Captina association.

2. Doniphan-Clarksville association

Gently sloping to steep, well drained and somewhat excessively drained, very cherty and stony soils; on uplands

This association is characterized by partly wooded, narrow areas on the tops of ridges and wooded side slopes that are adjacent to streams (fig. 3).

This association makes up about 1 percent of the survey area. It is about 46 percent Doniphan soils and about 42 percent Clarksville soils. The remaining 12 percent is soils of minor extent.

The well drained, gently sloping to steep Doniphan soils are on narrow ridgetops and side slopes. They have a surface layer of dark grayish brown very cherty silt loam. The subsurface layer is light yellowish brown very cherty silt loam. The upper part of the subsoil is yellowish red cherty silty clay loam, and the lower part is red and brownish yellow, mottled clay.

The somewhat excessively drained, gently sloping to steep Clarksville soils are on narrow ridgetops and side slopes. They have a surface layer of brown very cherty silt loam. The subsurface layer is pale brown very cherty silt loam. The upper part of the subsoil is multicolored very cherty silty clay loam, and the lower part is red very cherty clay.

Of minor extent are the somewhat excessively drained Midco soils, the excessively drained Wideman soils, and the well drained Nolin soils. All of these soils are on the bottom lands.

About 15 percent of this association has been cleared. Small areas on ridgetops and side slopes, and a few of the foot slopes are used for pasture. Large areas on the bottom lands and some small areas have been cleared and are used for pasture or meadow. The uncleared acreage consists mostly of rough, steep areas that are in mixed hardwood or pine. Production of timber and the raising of beef cattle and feeder pigs are the main enterprises.

The less sloping soils in this association are suited to pasture. The chert content of the soils, however, inhibits cultivation. Steep slopes and droughtiness are the main limitations to use of these soils for pasture. Maintaining fertility is the main concern of management. Overgrazing is an additional concern of pasture management.

The soils in this association are suitable for trees. Native trees are oak and pine. The steep slopes restrict the use of logging equipment, and erosion is a hazard along logging roads and skid trails. Seedling mortality is moderate on Clarksville soils and on the steeper areas of Doniphan soils.

The soils in this association are suitable for sanitary facilities and building site development. However, the slope of both soils and the moderate permeability and shrink-swell potential of the Doniphan soils are moderate or severe limitations. Both soils have only slight limitations on the more gently sloping areas.

3. Loring-Captina-Clarksville association

Gently sloping to steep, moderately well drained and somewhat excessively drained, silty and very cherty soils; on uplands

This association is characterized by partly wooded, broad ridges and somewhat benched and dissected side slopes. A few places are hilly (fig. 4). Small streams drain the areas of this association.

This asociation makes up about 24 percent of the survey area. It is about 31 percent Loring soils, 31 percent Captina soils, and 20 percent Clarksville soils. The remaining 18 percent is soils of minor extent.

The moderately well drained, gently sloping to strongly sloping Loring soils are on lower ridges, lower side slopes, and foot slopes. They have a surface layer of dark yellowish brown silt loam. The upper part of the subsoil is yellowish brown silt loam and strong brown, mottled silty clay loam; the next part is multicolored silty clay loam; the lower part is a fragipan of strong brown and yellowish brown, firm and brittle silt loam.

The moderately well drained, gently sloping and moderately sloping Captina soils are on broad ridgetops and side slopes. They have a surface layer of dark grayish brown silt loam. The subsurface layer is pale brown silt loam. The upper part of the subsoil is strong brown and light yellowish brown, mottled silty clay loam; the next part is a fragipan of light yellowish brown,

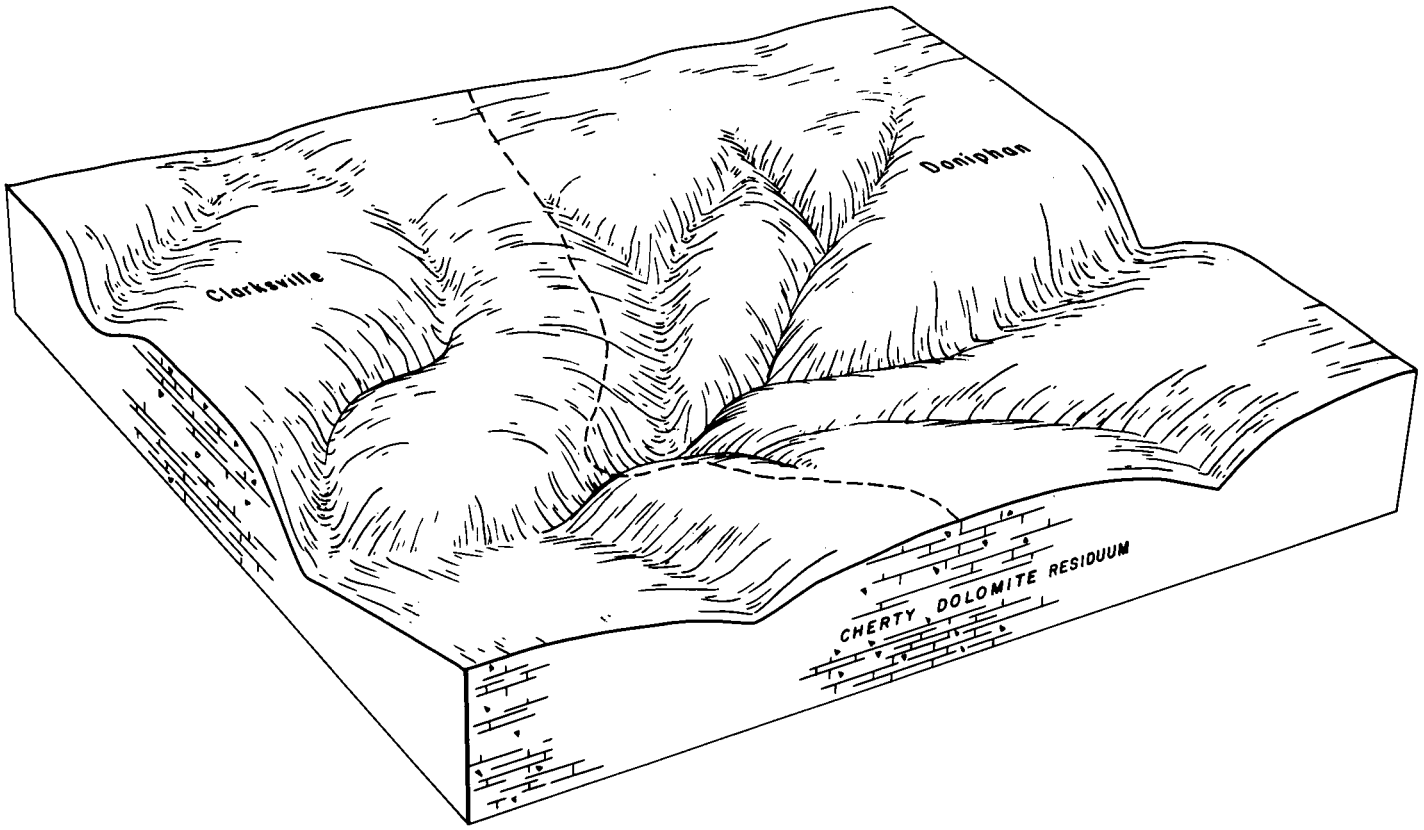


Figure 3. Typical pattern of soils and parent material in the Doniphan-Clarksville association.

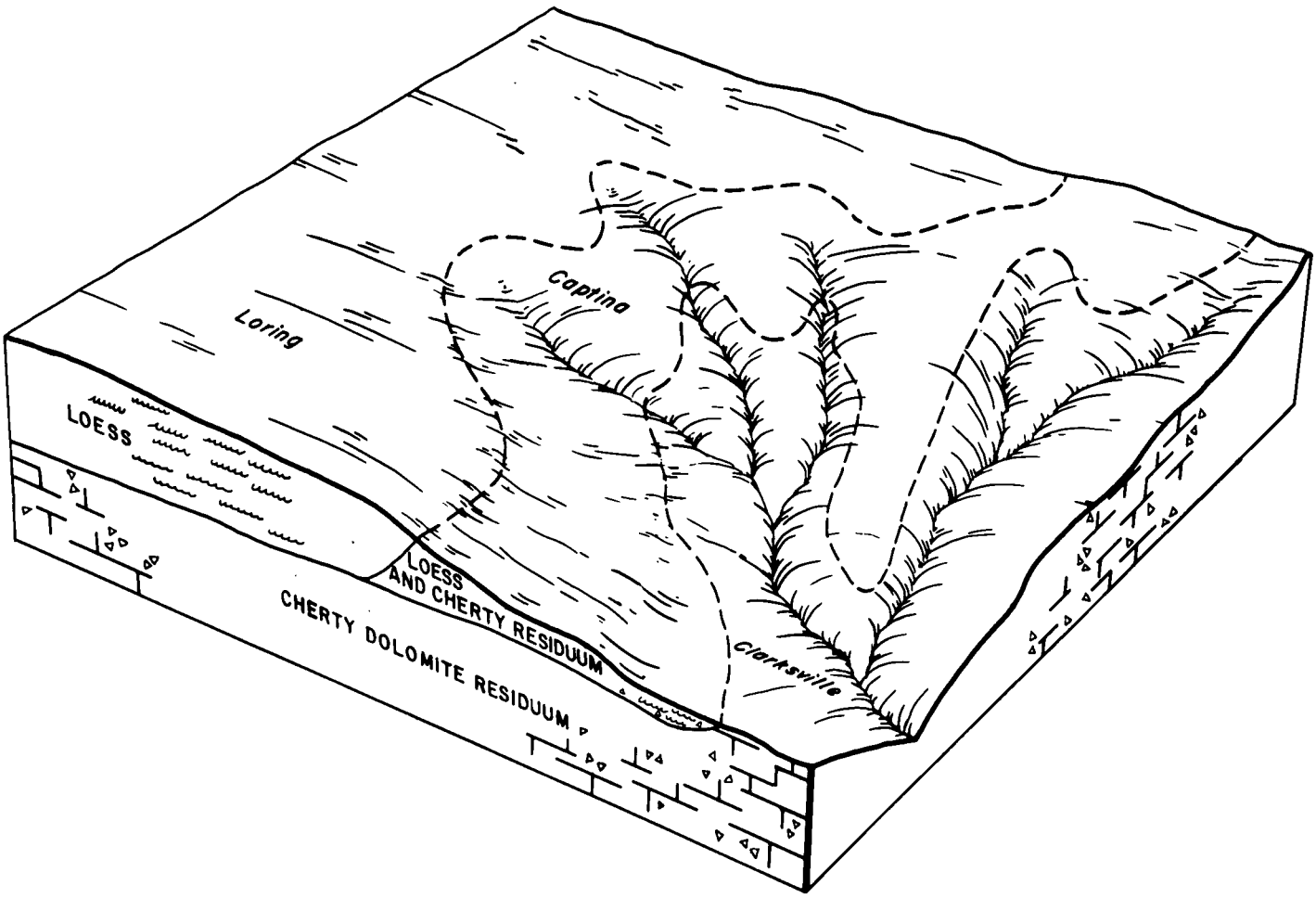


Figure 4. Typical pattern of soils and parent material in the Loring-Captina-Clarksville association.

mottled, firm and brittle very cherty silty clay loam; the lower part is strong brown, mottled cherty silty clay loam and red very cherty clay.

The somewhat excessively drained, gently sloping to steep Clarksville soils are on narrow ridges and side slopes of upland drainageways. They have a surface layer of brown very cherty silt loam. The subsurface layer is pale brown very cherty silt loam. The upper part of the subsoil is multicolored very cherty silty clay loam, and the lower part is red very cherty clay.

Of minor extent in this association are the somewhat excessively drained Midco soils, the moderately well drained Hontas and Adler soils, and the well drained Secesh soils. All of these soils are on bottom lands. Also included are Doniphan soils on narrow ridges and hillsides and Wilderness soils on ridgetops. Doniphan soils have more content of clay, and Wilderness soils have a fragipan and are cherty throughout.

About 40 percent of this association has been cleared. Most of the cleared areas are used for pasture. Row crops and wheat are grown in small fields on ridges and in the bottom land. The uncleared acreage consists mostly of side slopes and steep hillsides that are in mixed hardwood or hardwood and pine. Raising beef cattle and feeder pigs and the production of timber are the main enterprises.

The gently sloping and moderately sloping soils in this association are suited to wheat, row crops, and pasture. Erosion control, droughtiness, and maintaining fertility are the main concerns of management in areas where the soils are used for cultivated crops and grass or hay production. Overgrazing is an additional concern of pasture management.

The soils in this association are suitable for tree production. Native trees are oak and pine. Erosion is a hazard along logging roads and skid trails. The steeper

slopes of the Clarksville soils restrict the use of logging equipment. Seedling mortality is moderate on Captina and Loring soils and on steeper areas of the Clarksville soils.

The soils in this association are suitable for building site development and sanitary facilities. However, slow permeability and wetness are limitations for the Captina and Loring soils, and steeper slopes are moderate or severe limitations for the Captina and Clarksville soils.

4. Clarksville-Captina association

Gently sloping to steep, somewhat excessively drained and moderately well drained, very cherty and silty soils; on uplands

This association is characterized by partly wooded, narrow ridgetops and wooded side slopes that are adjacent to streams (fig. 5).

This association makes up about 23 percent of the survey area. It is about 53 percent Clarksville soils and about 19 percent Captina soils. The remaining 28 percent is soils of minor extent.

The somewhat excessively drained, gently sloping to steep Clarksville soils are on narrow ridges and side slopes of upland drainageways. They have a surface layer of brown very cherty silt loam. The subsurface layer is pale brown very cherty silt loam. The upper part of the subsoil is multicolored very cherty silty clay loam, and the lower part is red very cherty clay.

The moderately well drained, gently sloping and moderately sloping Captina soils are on broad ridgetops, upper side slopes, and foot slopes. They have a surface layer of dark grayish brown silt loam. The subsurface layer is pale brown silt loam. The upper part of the subsoil is strong brown and light yellowish brown, mottled silty clay loam; the next part is a fragipan of light yellowish brown, mottled, firm and brittle very cherty silty clay loam; the lower part is strong brown, mottled cherty silty clay loam and red very cherty clay.

The soils of minor extent are the somewhat excessively drained Midco soils; the excessively drained Wideman soils; the well drained Elk, Peridge, and Nolin soils; the somewhat poorly drained Hartville soils; and the moderately well drained Hontas and Adler soils.

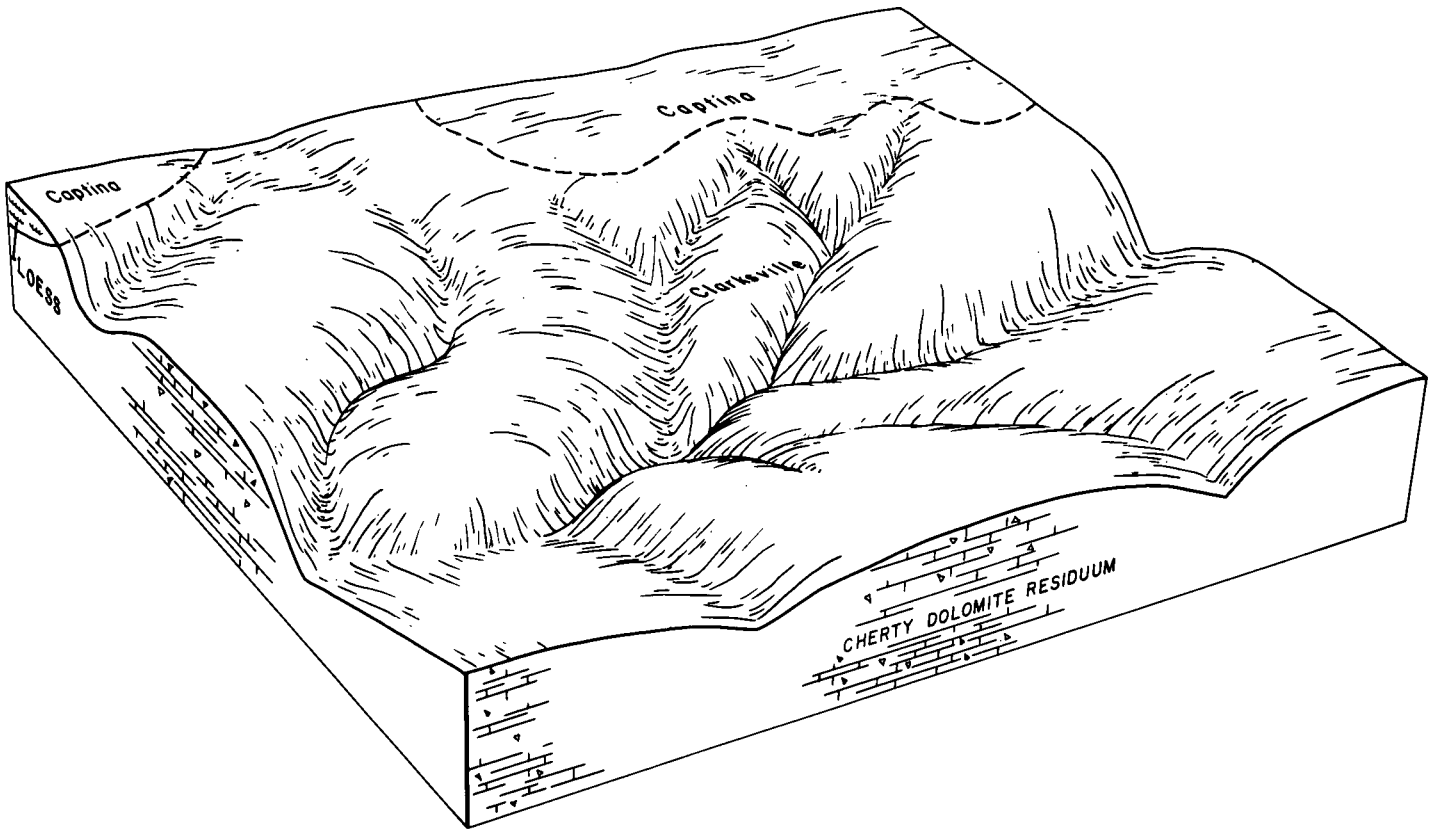


Figure 5. Typical pattern of soils and parent material in the Clarksville-Captina association.

Peridge soils are on low slopes. The other soils are on bottom lands.

About 15 percent of this association has been cleared. Small fields on ridges and on a few of the foot slopes are used for pasture and wheat. Large areas on the bottom lands and some small areas have been cleared and are used for pasture and meadow. The uncleared acreage consists mostly of rough, steep areas that are in mixed hardwoods or pine. Production of timber and the raising of beef cattle and feeder pigs are the main enterprises.

The less sloping soils in this association are suited to pasture and wheat. The chert content of the soils, however, inhibits cultivation. Steep slopes and droughtiness are the main limitations to use of these soils for pasture. Maintaining fertility is the main concern of management. Overgrazing is an additional concern of pasture management.

The soils in this association are suitable for trees. Native trees are pine and oak. The steep slopes restrict the use of logging equipment, and erosion is a hazard along logging roads and skid trails. Seedling mortality is moderate on Captina soils and on steeper areas of the Clarksville soils.

The soils in this association are suitable for sanitary facilities and building site development. However, the slope of the Clarksville soils and slope, slow permeability, and wetness of the Captina soils are limitations. Both soils have only slight limitations on the more gently sloping areas.

5. Calhoun-Amagon association

Nearly level, poorly drained, silty soils; on low terraces and flood plains

This association is characterized by low, broad terraces and flood plains. The terraces are drained by a system of old sloughs (fig. 6).

This association makes up about 22 percent of the survey area. It is about 54 percent Calhoun soils and 21 percent Amagon soils. The remaining 25 percent is soils of minor extent.

The poorly drained Calhoun soils are on broad, low terraces and flood plains. They are at slightly higher elevations than Amagon soils. Calhoun soils have a surface layer of grayish brown silt loam. The subsurface

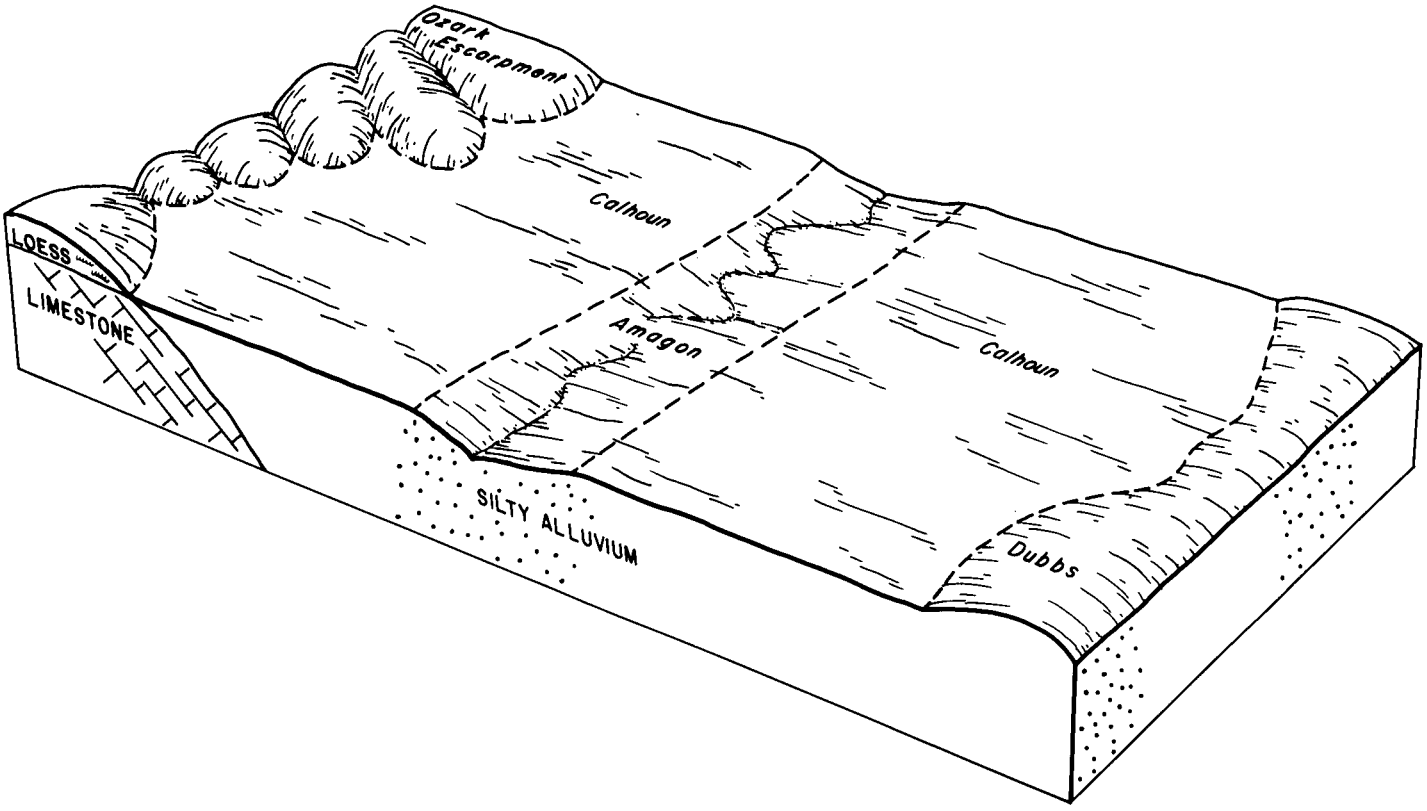


Figure 6. Typical pattern of soils and parent material in the Calhoun-Amagon association.

layer is light gray silt loam. The subsoil is light gray and light brownish gray silt loam and silty clay loam.

The poorly drained Amagon soils are in drainageways or in broad, slightly depressional areas on low terraces and flood plains. They have a surface layer of dark grayish brown silt loam. The subsoil is light brownish gray and light gray, mottled silty clay loam.

Of minor extent are the well drained Dubbs soils, the moderately well drained Adler soils, and the poorly drained Kobel soils. Dubbs and Adler soils are at higher elevations, and Kobel soils are in drainageways or slightly depressional areas.

Nearly all of the soils in this association are used for cultivated crops or small grain. A few small acreages are in pasture or timber. Cash crops are the main enterprise. A few feeder pigs are raised.

The soils in this association are suited to soybeans, grain sorghum, wheat, rice, cotton, corn, vegetables, and selected hay and pasture crops. Wetness is the main limitation to use of these soils. Most of the area, however, is drained by a system of ditches. Maintaining fertility is the main concern of management. Overgrazing and grazing when the soils are wet are additional concerns of pasture management if the pasture and soils are to be kept in good condition.

The soils in this association are suitable for tree production. Native trees are wetland oaks and cypress. Wetness severely limits the use of equipment on these soils. Seedling mortality is moderate.

The soils in this association generally are unsuitable for sanitary facilities and building site development. The hazards of flooding and wetness are limitations.

6. Tuckerman-Bosket association

Nearly level to moderately sloping, poorly drained and well drained, loamy soils; on low terraces and ridges and mounds of natural levees

This association is characterized by drainageways, basins, wide, low, terraces, and low mounds of natural levees (fig. 7). The levees are drained by a system of low channels and depressions.

This association makes up about 14 percent of the survey area. It is about 53 percent Tuckerman soils and 35 percent Bosket soils. The remaining 12 percent is soils of minor extent.

The nearly level or slightly depressional, poorly drained Tuckerman soils are on low terraces. They have a surface layer of dark grayish brown fine sandy loam. The subsurface layer is grayish brown fine sandy loam. The subsoil is light brownish gray fine sandy loam and sandy clay loam and gray, mottled sandy clay loam. The substratum to a depth of 60 inches is gray fine sandy loam.

The gently sloping and moderately sloping, well drained Bosket soils are on low mounds of natural levees. They have a surface layer of dark brown fine sandy loam. The subsurface layer is brown fine sandy loam. The subsoil is brown and dark yellowish brown sandy clay loam and fine sandy loam.

Of minor extent are the silty Amagon soils and the clayey Kobel soils. They are in drainageways or slightly depressional areas.

Most of the soils in this association are used for cultivated crops or small grain. Several acreages of Bosket soils are used for watermelons. A few small acreages are in pasture or timber. The uncleared acreages are in slightly depressional areas. Cash crops are the main enterprise. A few feeder pigs are raised.

The soils in this association are suited to soybeans, grain sorghum, wheat, rice, cotton, corn, vegetables, watermelons, hay, and pasture. Occasional flooding is a hazard on the Tuckerman soils. Control of erosion, improvement of drainage, and maintenance of fertility are the main concerns of management. Overgrazing and grazing when the soils are wet are additional concerns of pasture management if the pasture and soils are to be kept in good condition.

The soils in this association are suitable for trees. However, wetness is a severe limitation on the Tuckerman soils, and restricted use of equipment, the hazard of windthrow, and plant competition are major management concerns. Seedling mortality is moderate on both Tuckerman and Bosket soils.

The Tuckerman soils generally are unsuitable for sanitary facilities and building site development because of occasional flooding and wetness. The Bosket soils are suitable for use as sites for dwellings and sanitary facilities.

7. Calhoun-Crowley-Foley association

Nearly level, poorly drained and somewhat poorly drained, silty soils; on terraces and natural levees

This association is characterized by broad terraces that are old abandoned flood plains (fig. 8). The terraces are drained by a system of narrow drainageways.

This association makes up about 4 percent of the survey area. It is about 30 percent Calhoun soils, 24 percent Crowley soils, and 22 percent Foley soils. The remaining 24 percent is soils of minor extent.

The poorly drained Calhoun soils are on broad terraces at higher elevations than Crowley soils and at lower elevations than Foley soils. Calhoun soils have a surface layer of grayish brown silt loam. The subsurface layer is light gray silt loam. The subsoil is light gray and light brownish gray silt loam and silty clay loam.

The somewhat poorly drained Crowley soils are in broad, slightly depressional areas on natural levees. They have a surface layer of dark grayish brown silt loam. The subsurface layer is gray silt loam. The subsoil is grayish brown and gray, mottled silty clay loam.

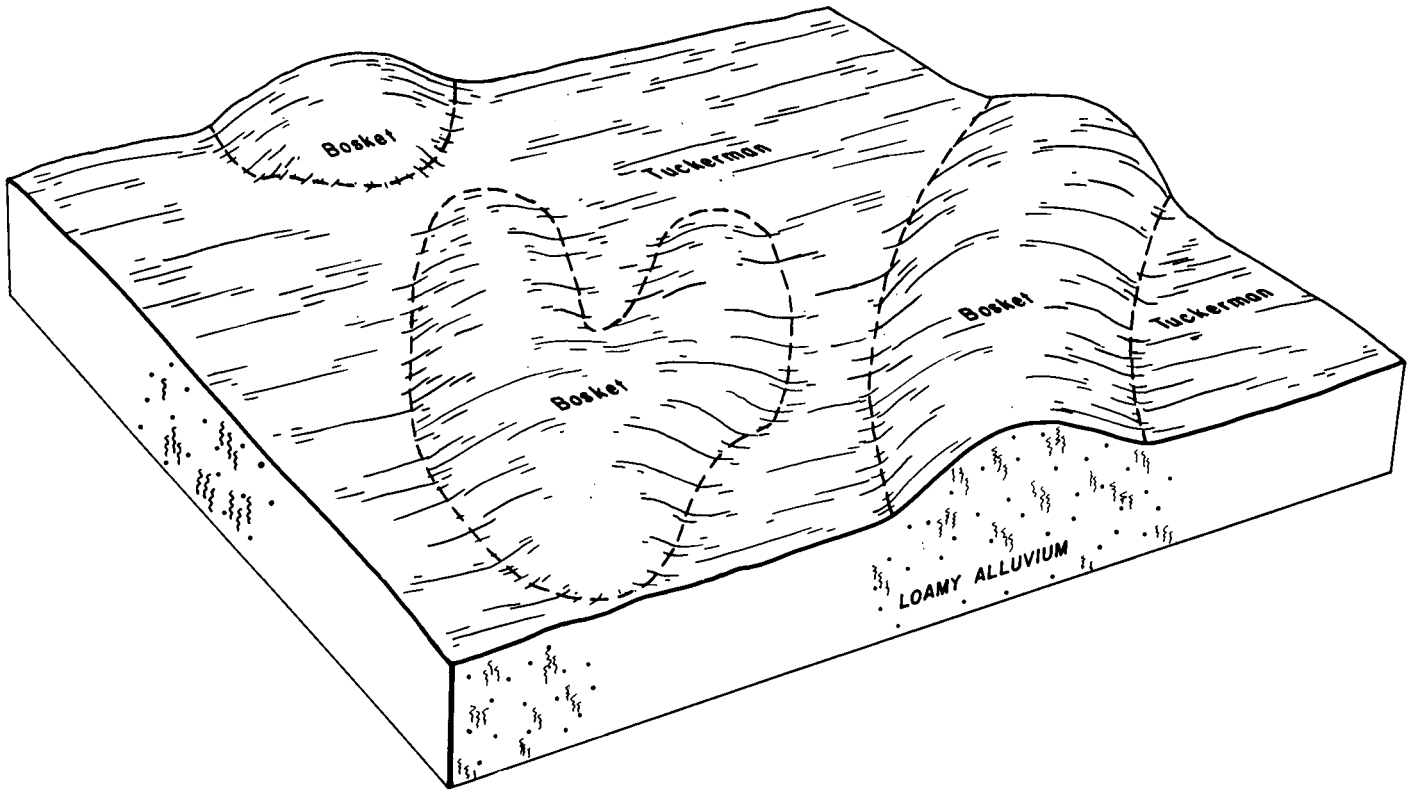


Figure 7. Typical pattern of soils and parent material in the Tuckerman-Bosket association.

The poorly drained Foley soils are on the higher part of the natural levees. They have a surface layer of brown silt loam. The subsurface layer is light brownish gray silt loam. The subsoil is light brownish gray, mottled silt loam and silty clay loam.

Of minor extent are the well drained Dubbs soils, the sodium rich Lafe soils, and the more clayey Houlka soils. Dubbs soils are on high ridges, Lafe soils are on high positions or side slopes, and Houlka soils are in drainageways or slightly depressional areas.

Most of the soils of this association are used for cultivated crops or small grain. A few small acreages are in pasture or timber. Cash crops are the main enterprise. A few feeder pigs are raised.

The soils of this associaion are suited to soybeans, grain sorghum, wheat, rice, cotton, corn, and selected hay and pasture crops. Wetness is the main limitation to use of these soils; however, most of the area is drained by a system of ditches. Maintaining fertility is a main concern of management. Overgrazing and grazing during wet periods are additional concerns of pasture management if the pasture and soil are to be kept in good conditon.

The soils in this association are suitable for trees. Native trees are wetland oaks. Use of equipment is severely restricted on these soils because of wetness. Seedling mortality, the hazard of windthrow, and plant competition are also concerns of management.

The soils in this association generally are unsuitable for sanitary facilities and building site development because of wetness. The water table is 2 feet or less below the surface in all of the major soils during wet periods.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Clarksville very cherty silt loam, 2 to 9 percent slopes, is one of several phases in the Clarksville series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Tuckerman-Bosket fine sandy loams, 0 to 5 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Descriptions of the detailed soil map units follow.

1—Adler silt loam. This nearly level, moderately well drained soil is on slightly depressional areas of first bottoms. It is along the larger streams and their tributaries and is occasionally flooded. Areas are elongated and range from 6 to about 100 acres.

Typically, the surface layer is mixed brown, very pale brown, and light gray, very friable silt loam. It is about 11 inches thick. The substratum is mottled, very friable silt loam to a depth of about 60 inches. It is pale brown in the upper part and light brownish gray and gray in the lower part. In some places the upper part of the substratum is strongly acid.

Included with this soil in mapping and making up 5 to 10 percent of the unit are areas of Calhoun soil. These soils are poorly drained and in a narrow, slightly lower lying band adjacent to the boundaries of the unit.

Permeability of the Adler soil is moderate, and surface runoff is slow. This soil has high available water capacity. Reaction is medium acid or slightly acid in the upper part of the substratum. It varies widely in the surface layer as a result of local liming practices. This soil has medium natural fertility and low organic matter content. The surface layer tills easily under a wide range in moisture conditions. A seasonal high water table, which is within 2 to 3 feet of the surface, limits root development.

More than half of the acreage of this soil is used for pasture or hay. Cultivated crops and wheat are also grown. A few areas are in woodland. This soil is suited to grain sorghum, soybeans, wheat, vegetables, and grasses and legumes for hay and pasture. Flooding is a hazard in most places if this soil is used for cultivated

crops. Some areas are protected by levees. Damage from flooding can be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. If this soil is used for cultivated crops, returning crop residue or the regular addition of other organic materials helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Deep-rooted plants should not be grown on this soil because of the seasonal high water table.

This soil is suitable for trees, but plant competition is a limitation. Competing vegetation can be controlled or removed by careful and thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting. Release treatments may be necessary to ensure development.

This soil generally is unsuitable for building site development and sanitary facilities because of occasional flooding.

The capability subclass is IIw, and the woodland ordination symbol is 1o.

2—Amagon silt loam. This nearly level, poorly drained soil is in former drainageways, slightly concave basins, and on low flat terraces and flood plains. It is subject to occasional flooding in most places. Areas generally are elongated and are 6 to several hundred acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil to a depth of about 60 inches is light brownish gray and light gray, mottled, very firm silty clay loam.

Included with this soil in mapping and making up 5 to about 15 percent of the unit are areas of Kobel and Tuckerman soils. Some ponded areas of Amagon soils are also included. The Kobel soil has more clay throughout and is in shallow depressions and drainageways. The Tuckerman soil has more sand throughout. It is adjacent to the boundaries of the unit and at a slightly higher elevation.

Permeability of the Amagon soil is slow, and surface runoff is very slow. Available water capacity is high. The surface layer is strongly acid or very strongly acid unless limed. The organic matter content and natural fertility are low. This soil is in good tilth and is easily worked. A seasonal high water table, which is within 1 foot to 2 feet of the surface, limits root development. Shrink-swell potential is moderate.

Most areas of this soil are cultivated. Several areas are in pasture, hay, and timber. This soil is suited to soybeans, wheat, grain sorghum, cotton, rice, irrigated corn, vegetables, and selected plants for pasture and hay (fig. 8). In most places, crops should be planted late in spring and harvested early in fall to reduce the risk of flood damage. Some areas are protected by levees. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Land grading and drainage ditches can be installed to dispose of excess water. Returning crop residue helps to improve fertility, reduce crusting, and increase water infiltration.

Areas used for pasture or hay generally are small. The soil is easily compacted if grazed or worked when it is wet. Grazing when the soil is wet also causes poor tilth and reduces the stand of grasses. Proper stocking rates, timely delay of grazing, and deferment of hay cutting during wet periods help to keep the pasture, hay, and soil in good condition. Plants that tolerate wetness should be grown.

This soil is suited to trees, and a few small areas remain in native timber. Restricted use of equipment is a concern during wet periods. Equipment operations should be timed for periods during which the soil is dry or frozen. Seedling mortality, the hazard of windthrow, and plant competition are management concerns. Ridging the soil and planting on the ridge helps to achieve better survival. Lighter, less intensive, more frequent thinnings to reduce the stand density help to minimize the damage from windthrow. Thorough site preparation helps to overcome plant competition. Such preparation may include prescribed burning, spraying, or cutting.

This soil generally is unsuitable for building site development and sanitary facilities because of occasional flooding.

The capability subclass is IIIw, and the woodland ordination symbol is 1w.

3B—Elk silt loam, 1 to 4 percent slopes. This nearly level and gently sloping, well drained soil is on terraces along the larger streams and their major tributaries. It is subject to occasional flooding. Areas are elongated and

Figure 8. Wheat nearing maturity on Amagon silt loam.

range from 6 to several hundred acres. Slopes are both convex and concave.

Typically, the surface layer is brown silt loam about 7 inches thick. The brown subsoil to a depth of 60 inches or more is friable silt loam and firm silty clay loam.

Included with this soil in mapping and making up about 5 to 10 percent of the unit are areas of soils that are more sandy throughout or that have numerous small chert fragments throughout. Also included are areas of Midco and Secesh soils. The somewhat excessively drained Midco soils are at a slightly higher elevation and are near small drainageways. Secesh soils have gravel at a moderate depth and are at a slightly lower elevation adjacent to the streams. The soils that are sandy throughout or that have small chert fragments throughout are at a higher elevation adjacent to large drainageways.

Permeability of the Elk soil is moderate, and surface runoff is slow or medium. The available water capacity is high. The surface layer is medium acid unless limed. Natural fertility is medium, and the organic matter content is moderate. This soil is easy to till and can be worked through a wide range in moisture content.

Most areas of this soil are used for pasture or hay. A few areas are used for cultivated crops, and a small acreage is in timber. This soil is suited to grasses and legumes for pasture and hay (fig. 9). It is also suited to wheat, soybeans, grain sorghum, corn, and vegetables. Because flooding is a hazard, crops should be planted late in spring and harvested early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Soil erosion generally is not a major hazard on this soil unless the soil is disturbed by cultivation and left in a bare, exposed condition for a long period. Proper management of crop residue and green manure crops help to control erosion, maintain and improve the organic matter content and tilth, and increase water infiltration.

Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suitable for trees, but plant competition is a mangement concern. This can be overcome by careful site preparation, including prescribed burning, spraying,

Figure 9. Harvested hay on an area of Elk silt loam.

or cutting. There are no other hazards or limitations for planting or harvesting trees.

This soil generally is unsuitable for building site development and sanitary facilities because of occasional flooding.

The capability subclass is IIw, and the woodland ordination symbol is 2o.

4D—Bardley cherty silt loam, 9 to 14 percent slopes. This moderately deep, strongly sloping, well drained soil is on narrow ridgetops and side slopes. Areas are irregular in shape and range from 6 to 40 acres.

Typically, the surface layer is dark grayish brown cherty silt loam about 4 inches thick. The subsurface layer is brown very cherty silt loam about 4 inches thick. The subsoil is yellowish red and strong brown, very firm clay about 19 inches thick. Hard bedrock is at a depth of about 27 inches.

Included with this soil in mapping are small areas of deep Doniphan soils, somewhat excessively drained Gasconade soils, and moderately well drained Gatewood soils. Doniphan and Gasconade soils are intermingled throughout. Gatewood soils are on the more gently sloping areas. These soils make up about 5 to 10 percent of the unit.

Permeability of the Bardley soil is moderate, and surface runoff is rapid. The available water capacity is very low. The surface layer and upper part of the subsoil are very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content of the surface layer inhibits the use of tillage machinery. Root development is restricted because of bedrock at a moderate depth. Shrink-swell potential is moderate.

Most areas of this soil are used for pasture. Several areas are in timber. This soil generally is unsuited to cultivated crops because of the low available water capacity and high chert content. This soil is suitable for pasture. Overgrazing or grazing when the soil is wet, however, causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is poorly suited to most trees because of droughtiness; however, cedar trees grow well on this soil. Seedling mortality and the hazard of windthrow are concerns of management. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival of seedlings. Lighter, less intensive, more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

This soil is suitable for building site development and sanitary facilities but has limitations for dwellings because of depth to bedrock and moderate shrink-swell potential. If this soil is used for building site development, some rock may need to be excavated and the excavated areas backfilled with soil. Strengthening the footings and foundations with adequate reinforcement helps to prevent the damage caused by shrinking and swelling of the soil. Nearby soils are generally better suited to waste disposal. If this soil is used for sewage lagoons, the less sloping areas should be selected, and depth to the slowly permeable soil material over the bedrock should be increased. This soil has limitations for local roads and streets because of low strength, frost action, shrink-swell potential, and slope. The road base needs to be strengthened with suitable material to prevent damage caused by low strength. Designing the road to conform to the natural slope and grading it to shed water help to prevent damage caused by frost action and shrinking and swelling of the soil.

The capability subclass is VIs, and the woodland ordination symbol is 5c.

5B—Bosket fine sandy loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridges and mounds of low, long, narrow natural levees that border old stream channels. Slopes are mostly convex and relatively short. Areas range from 6 to 50 acres.

Typically, the surface layer is dark brown, very friable fine sandy loam about 6 inches thick. The subsurface layer is dark yellowish brown, very friable sandy loam about 10 inches thick. The subsoil to a depth of about 48 inches is brown, firm sandy clay loam. The substratum is dark yellowish brown, friable fine sandy loam. In some places small areas have steeper slopes than typical.

Included with this soil in mapping and making up about 5 to 10 percent of the unit are areas of poorly drained Tuckerman soils. They are in shallow depressions and drainageways.

Permeability of the Bosket soil is moderate, and surface runoff is slow. This soil has moderate available water capacity. The surface layer is strongly acid or medium acid unless limed. Fertility is medium, and the organic matter content is moderate. This soil is easy to keep in good tilth.

Most areas of this soil are cultivated. Several areas are used for watermelons. A few areas are in woodland, pasture, or hay. This soil is suited to soybeans, grain sorghum, wheat, cotton, irrigated corn, vegetables, watermelons, and grasses and legumes for hay and pasture. It is also suitable for orchards. Areas that are cultivated are subject to water erosion and wind erosion. Minimum tillage, conservation of residue, and winter cover crops help to control erosion. Returning crop residue also helps to improve fertility, reduce crusting, and increase water infiltration (fig. 10).

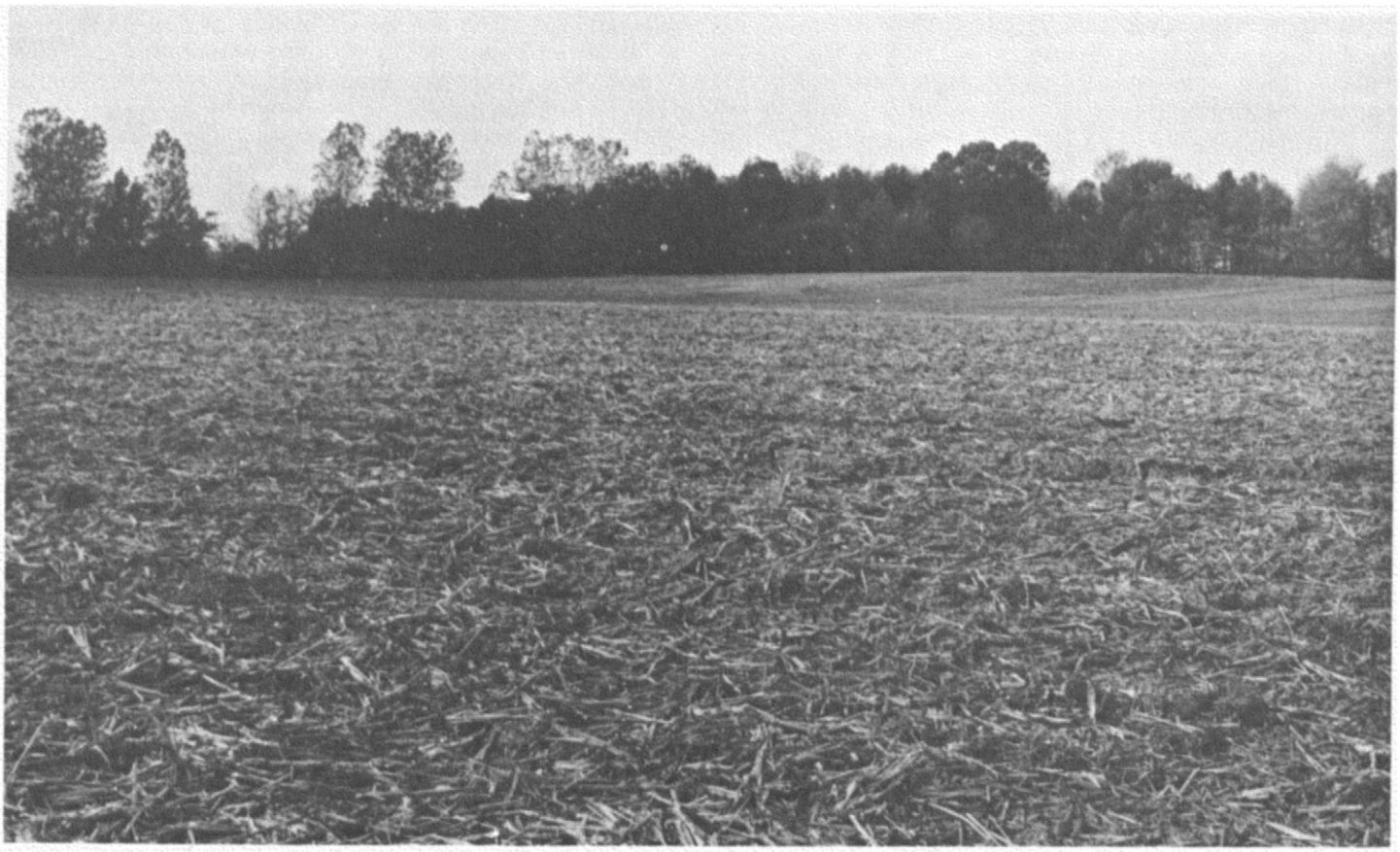


Figure 10. Crop residue on the surface of Bosket fine sandy loam, 2 to 5 percent slopes.

If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suitable for trees, and a few small areas remain in native timber. Plant competition is moderate. Competing vegetation can be controlled by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting. There are no other hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development, local roads and streets, and septic tank absorption fields. Seepage is a limitation for sewage lagoons, but excessive seepage can be prevented by sealing the bottom and berms of the lagoon with slowly permeable material.

The capability subclass is IIe, and the woodland ordination symbol is 2o.

5C—Bosket fine sandy loam, 5 to 9 percent slopes. This moderately sloping, well drained soil is on mounds and high ridges of natural levees. Slopes are mostly convex. Areas range from 6 to 50 acres.

Typically, the surface layer is dark brown fine sandy loam about 9 inches thick. The subsurface layer is brown fine sandy loam about 8 inches thick. The subsoil is brown and dark yellowish brown sandy clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is brown, stratified loamy fine sand and fine sandy loam. In places small areas have slopes of less than 5 percent.

Included with this soil in mapping and making up about 5 to 10 percent of the unit are areas of poorly drained Tuckerman soils. They are in shallow depressions and drainageways.

Permeability of the Bosket soil is moderate, and surface runoff is medium. This soil has moderate available water capacity. The surface layer is strongly acid or medium acid unless limed. This soil has medium natural fertility, and the organic matter content is moderate. It is easy to keep in good tilth.

Most areas of this soil are cultivated. Several areas are used for watermelons. A few areas are in woodland, pasture, or hay. This soil is suited to soybeans, grain sorghum, wheat, cotton, irrigated corn, vegetables, watermelons, and grasses and legumes for hay and pasture. It is also suitable for orchards. Areas that are cultivated are subject to water erosion and wind erosion. Minimum tillage, conservation of residue, and winter cover crops help to control erosion. Returning crop residue also helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suitable for trees, and a few areas remain in native timber. Plant competition is a management concern. Competing vegetation can be controlled by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting. There are no other hazards or limitations for planting or harvesting trees.

This soil is suitable for use as sites for dwellings, septic tank absorption fields, and local roads and streets. Slope is a limitation for small commercial buildings. Land shaping may be needed, or the building can be designed to conform to the slope. Seepage is a limitation for lagoons; however, excessive seepage can be prevented by sealing the bottom and berms of lagoons with slowly permeable material. In addition, some land shaping may be needed because of the slope.

The capability subclass is IIIe, and the woodland ordination symbol is 2o.

6C2—Bosket fine sandy loam, 4 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on mounds and high ridges of natural levees. Slopes are mostly convex. Areas range from 6 to 50 acres.

Typically, the surface layer is dark yellowish brown fine sandy loam about 4 inches thick. The subsoil is brown and strong brown sandy clay loam about 23 inches thick. The substratum to a depth of 60 inches or more is strong brown sandy loam. In places small areas have slopes of less than 4 percent.

Included with this soil in mapping and making up about 5 to 10 percent of the unit are small, severely eroded areas and areas of poorly drained Tuckerman soils. The Tuckerman soils are in shallow depressions and drainageways.

Permeability of the Bosket soil is moderate, and surface runoff is medium. The available water capacity is moderate. The surface layer is strongly acid or medium acid unless limed. This soil has medium natural fertility, and the organic matter content is moderate. It is easy to keep in good tilth, except in areas that are severely eroded.

Most areas of this soil are cultivated. Several areas are used for watermelons, and a few areas are used for pasture or hay. This soil is suited to soybeans, grain sorghum, wheat, cotton, irrigated corn, vegetables, watermelons, and grasses and legumes for hay and pasture. It is also suitable for orchards. If this soil is cultivated, erosion is a hazard. Conservation of residue, minimum tillage, and winter cover crops help to control erosion. Returning crop residue also helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suitable for trees. Plant competition is a management concern. Competing vegetation can be controlled by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting. There are no other hazards or limitations for planting or harvesting trees.

This soil is suitable for use as sites for dwellings, septic tank absorption fields, and local roads and streets. Slope is a limitation for small commercial buildings. Land shaping may be needed, or the building may be designed to conform to the slope. Septic tank absorption fields function adequately on this soil if proper design and installation procedures are used.

The capability subclass is IIIe, and the woodland ordination symbol is 2o.

7—Calhoun silt loam, occasionally flooded. This nearly level, poorly drained soil is on high and low terraces and on flood plains. It is occasionally flooded. Areas are elongated, and some areas are irregular in shape. They range from 6 to several hundred acres.

Typically, the surface layer is grayish brown, very friable silt loam about 7 inches thick. The subsurface layer is light gray, very friable silt loam about 9 inches thick. The mottled subsoil to a depth of 60 inches or more is light gray and light brownish gray silt loam and silty clay loam.

Included with this soil in mapping and making up 5 to 15 percent of the unit are intermingled areas of Lafe, Foley, or Dubbs soils and some ponded areas of Calhoun soils. Small areas of borrow pits and spoil along the St. Francis River are also included. The Lafe and Foley soils are high in content of sodium and are at slightly higher elevations. The well drained Dubbs soils are on small mounds or ridges.

Permeability of the Calhoun soil is slow, and surface runoff is slow or very slow. The available water capacity

is high. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility is medium, and organic matter content is low. The friable surface layer is in good tilth and is easily worked but tends to crust and puddle if worked when wet or after hard rains. A perched water table is near the surface or is within 2 feet of the surface during wet periods. Shrink-swell potential is moderate.

Most areas of this soil are cultivated. Several areas are used for pasture, hay, or timber. This soil is suited to soybeans, wheat, grain sorghum, cotton, rice, irrigated corn, vegetables, and selected grasses and legumes for pasture and hay (fig. 11). Flooding is a hazard on this soil in most places. Flooding is of short duration, however, and generally occurs early enough in the season so that wheat is not damaged. Some areas are protected by levees. Crops should be planted late in spring and harvested early in fall to reduce the risk of flood damage. Except where potholes occur, the excess surface water can be removed by a system of field and lateral ditches. Land grading helps eliminate potholes, improves surface drainage, and provides a suitable grade for irrigation. Residue management that leaves a protective surface cover helps to reduce surface crusting and improve fertility and water intake.

Areas used for pasture or hay generally are small. This soil is easily compacted if grazed or worked when wet. Grazing when the soil is wet also causes poor tilth and reduces the stand of grasses. Proper stocking rates, timely deferment of grazing, and deferment of hay cutting during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown.

This soil is suitable for trees, and a few small areas remain in native timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods during which the soil is dry or frozen. Once seedlings are established, they grow well; however, moderate seedling mortality is likely. Ridging the soil and planting on the ridges helps to increase seedling survival. Lighter, less intensive, more

Figure 11. Grain sorghum nearing maturity on Calhoun silt loam, occasionally flooded.

frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow. Plant competition for seedlings can be reduced by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting.

This soil generally is unsuitable for building site development and sanitary facilities because of occasional flooding.

The capability subclass is IIIw, and the woodland ordination symbol is 3w.

8B—Captina silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on broad ridgetops, side slopes, and foot slopes. The slopes are mostly convex, but some are concave. Areas are elongated in most places and range from 10 to 100 acres.

Typically, the surface layer is dark grayish brown, very friable silt loam about 4 inches thick. The subsurface layer is pale brown, very friable silt loam about 4 inches thick. The next layer to a depth of about 28 inches is strong brown and grayish brown, mottled, firm silty clay loam. Below this is a fragipan of pale brown and light yellowish brown, mottled, firm and brittle very cherty and cherty clay loam about 29 inches thick. The next layer to a depth of about 60 inches is red, firm very cherty clay. In places the mottled solum does not contain chert. In other places the fragipan and lower part of the subsoil contain gravel. In places the lower part of the subsoil is as much as 30 percent chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Clarksville, Doniphan, and Wilderness soils. These soils have cherty surface layers and are on narrow ridgetops and steeper slopes.

Permeability of the Captina soil is moderate above the fragipan and slow in the fragipan. Surface runoff is slow. Available water capacity is moderate. The surface layer is strongly acid or very strongly acid unless limed. Organic matter content is low, and natural fertility is medium. The friable surface layer is in good tilth and is easily worked. It tends to crust and puddle, however, if worked when wet or after hard rains. The rooting depth of plants is limited by the fragipan. A perched water table is above the fragipan during wet periods.

More than half of the acreage of this soil remains in timber. A large acreage is in pasture or hay, and a few areas are used for orchards, wheat, or row crops. This soil is suited to corn, soybeans, and wheat. It is also suitable for orchards. This soil is very erosive if it is cultivated extensively. Minimum tillage, winter cover crops, and contour farming help to control erosion. Residue management that provides large amounts of protective cover on the surface helps to maintain or improve the organic matter content and tilth.

If this soil is used for pasture, overgrazing or grazing when the soil is wet results in compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the spring months.

This soil is suited to trees. Seedling mortality can be reduced by planting special stock of larger size than usual. Lighter, less intensive, more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

This soil is suitable for building site development and onsite waste disposal; however, shrink-swell potential and wetness are limitations for dwellings. Foundations, basement walls, and footings should be properly designed and constructed to prevent damage caused by shrinking and swelling of the soil and excessive wetness. Adequate reinforcement and treatment, such as sealing the wall and using foundation and footing drains, are needed. Sewage lagoons should function adequately, but some leveling is required because of slope. Road bases need to be strengthened with suitable material to prevent damage caused by low strength. Grading the road to shed water and constructing adequate side ditches and culverts help to prevent damage caused by wetness and frost action.

The capability subclass is IIe, and the woodland ordination symbol is 4d.

8B2—Captina silt loam, 2 to 5 percent slopes, eroded. This gently sloping, moderately well drained soil is on broad ridgetops, side slopes, and foot slopes. Slopes are mostly convex, but some are concave. Areas are elongated in most places and range from 10 to 100 acres.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown and light yellowish brown, mottled, firm silty clay loam; the middle part is a fragipan of pale brown, mottled, firm and brittle very cherty silty clay loam; and the lower part is brownish yellow, very firm cherty clay. In places numerous, intermingled, small to large gullies and other erosion scars expose the strong brown subsoil. In other places the soil does not have chert. In places the fragipan and lower part of the subsoil contain gravel. In places the lower part of the subsoil is as much as 30 percent chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Clarksville, Doniphan, and Wilderness soils. These soils have cherty surface layers and are on narrow ridgetops and steeper slopes.

Permeability of the Captina soil is moderate above the fragipan and slow in the fragipan. Surface runoff is medium. Available water capacity is moderate. The

surface layer is strongly acid or very strongly acid unless limed. The organic matter content is low, and natural fertility is medium. This soil is difficult to keep in good tilth because of erosion. The rooting depth of plants is limited by the fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or hay. A few areas are used for orchards, wheat, or row crops. This soil is suited to corn, soybeans, and wheat, and it is also suitable for orchards. This soil is very erosive. Minimum tillage, winter cover crops, and contour farming help to control erosion. Residue management that provides large amounts of protective cover on the surface helps to maintain or improve the organic matter content and tilth.

If this soil is used for pasture and hay, overgrazing or grazing when the soil is wet results in compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to maintain the pasture and keep the soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the spring months.

This soil is suited to trees. Seedling mortality can be reduced by planting special stock of larger size than usual. Lighter, less intensive, more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

This soil is suitable for building site development and onsite waste disposal. Shrink-swell potential and wetness are limitations for dwellings. Foundations, basement walls, and footings should be properly designed and constructed to prevent damage caused by shrinking and swelling of the soil and excessive wetness. Adequate reinforcement and treatment, such as sealing the wall and using foundation and footing drains, are needed. Road bases should be strengthened with suitable material to prevent damage caused by low strength. Grading the road to shed water and constructing adequate side ditches and culverts help to prevent damage caused by wetness and frost action.

The capability subclass is IIIe, and the woodland ordination symbol is 4d.

8C—Captina silt loam, 5 to 9 percent slopes. This moderately sloping, well drained soil is on broad ridgetops, side slopes, and foot slopes. Slopes are mostly convex, but some are concave. Areas are elongated in most places and range from 10 to 200 acres.

Typically, the surface layer is yellowish brown silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown and yellowish brown, mottled, firm silty clay loam; the middle part is a fragipan of light yellowish brown, mottled, firm and brittle very cherty silty clay loam; and the lower part is red, firm clay. In places the soil does not have chert. In other places the fragipan and lower part of the subsoil contain gravel. In places the lower part of the subsoil is as much as 30 percent chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Clarksville, Doniphan, and Wilderness soils. These soils have cherty surface layers and are on ridge points and steeper slopes.

Permeability of the Captina soil is moderate above the fragipan and slow in the fragipan. Surface runoff is medium. Available water capacity is moderate. The surface layer is strongly acid or very strongly acid unless limed. The organic matter content is low, and natural fertility is medium. The friable surface layer is in good tilth and is easily worked but tends to crust and puddle if worked when wet or after hard rains. The rooting depth of plants is limited by the fragipan. A perched water table is above the fragipan during wet periods.

More than half of the acreage of this soil remains in woodland. A large acreage is used for pasture or hay, and a few areas are used for orchards, wheat, or row crops. This soil is suited to limited production of corn and soybeans and to wheat. It is also suitable for orchards. This soil is very erosive if it is cultivated extensively. Minimum tillage, winter cover crops, and contour farming help to control erosion. Residue management that provides large amounts of protective cover helps to maintain or improve the organic matter content and tilth.

If this soil is used for pasture and hay, overgrazing or grazing when the soil is wet results in compaction, excessive runoff, and poor tilth. Pasture rotation, proper stocking rates, and restricted use during wet periods help to keep the soil and pasture in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the spring months.

This soil is suited to trees. Seedling mortality can be reduced by planting special stock of larger size than usual. Lighter, less intensive, but more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

This soil is suitable for building site development and onsite waste disposal. Shrink-swell potential and wetness are limitations for dwellings with basements, and slope and wetness are limitations for dwellings without basements. Foundations, basement walls, and footings should be properly designed and constructed to prevent damage caused by shrinking and swelling of the soil and excessive wetness. Adequate reinforcement and treatment, such as sealing the walls and using foundation and footing drains, are needed. Slope is a limitation for small commercial buildings and sewage

lagoons. Buildings should be designed to conform to the natural slope, or the land shaped to accommodate the building. Areas used for lagoons can be leveled, or the sewage can be piped to adjacent areas that have more suitable soils. Road bases need to be strengthened with suitable material to prevent damage caused by low strength. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by wetness and frost action. Some cut and fill may be needed because of slope.

The capability subclass is IIIe, and the woodland ordination symbol is 4d.

8C2—Captina silt loam, 5 to 9 percent slopes, eroded. This moderately sloping, moderately well drained soil is on broad ridegetops, side slopes, and foot slopes. Slopes are mostly convex, but some are concave. Areas are elongated in most places and range from 10 to 200 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown silt loam and silty clay loam; the middle part is a fragipan of light brownish yellow, mottled, firm and brittle very cherty silty clay loam; and the lower part is red, firm clay. In places numerous, intermingled small to large gullies and other erosion scars expose the strong brown subsoil. In places the fragipan and lower part of the subsoil contain gravel. In some places the soil does not have chert. In other places the lower part of the subsoil is as much as 30 percent chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Clarksville, Doniphan, and Wilderness soils. These soils have cherty surface layers and are on ridge points and steeper slopes.

Permeability of the Captina soil is moderate above the fragipan and slow in the fragipan. Surface runoff is medium. Available water capacity is moderate. The surface layer is strongly acid or very strongly acid unless limed. The organic matter content is low, and natural fertility is medium. The friable surface layer is in good tilth and is easily worked, but it tends to crust and puddle if worked when wet or after hard rains. The rooting depth of plants is limited by the fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or hay. A few areas are used for orchards, wheat, or row crops. This soil is suited to limited production of corn, soybeans, and wheat. It is also suitable for orchards. This soil is very erosive if it is cultivated extensively. Minimum tillage, winter cover crops, and contour farming help to control erosion. Residue management that provides large amounts of protective cover on the surface helps to maintain or improve the organic matter content and tilth.

If this soil is used for pasture and hay, overgrazing or grazing when the soil is wet results in compaction, excessive runoff, and poor tilth. Pasture rotation, proper stocking rates, and restricted use during wet periods help to keep the soil and pasture in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the spring months.

This soil is suited to trees. Seedling mortality can be reduced by planting special stock of larger size than usual. Lighter, less intensive, more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

This soil is suitable for building site development and onsite waste disposal. Shrink-swell potential and wetness are limitations for dwellings with basements, and slope and wetness are limitations for dwellings without basements. Foundations, basement walls, and footings should be properly designed to prevent damage caused by shrinking and swelling of the soil and excessive wetness. Adequate reinforcement and treatment, such as sealing the wall and using foundation and footing drains, are needed. Slope is a limitation for small commercial buildings and sewage lagoons. Buildings should be designed to conform to the natural slope, or the land shaped to accommodate the building. Areas used for sewage lagoons can be leveled, or the sewage can be piped to adjacent areas that have suitable soils. Road bases need to be strengthened with suitable material to prevent damage caused by low strength. Grading the roads to shed water and constructing side ditches and culverts help to prevent damage caused by wetness and frost action. Some cut and fill may be needed because of slope.

The capability subclass is IVe, and the woodland ordination symbol is 4d.

9C—Clarksville very cherty silt loam, 2 to 9 percent slopes. This deep, gently sloping and moderately sloping, somewhat excessively drained soil is on narrow ridgetops, side slopes, and foot slopes. Most slopes are convex, but some are concave. Areas are much longer than wide and range from 6 to several hundred acres.

Typically, the surface layer is dark grayish brown very cherty silt loam about 5 inches thick. The subsurface layer is light yellowish brown very cherty silt loam about 19 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown and strong brown very cherty silty clay loam, and the lower part is red very cherty clay. In places the upper part of the subsoil has less chert and is clay.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Captina or Wilderness soils. These soils have fragipans and are in concave positions adjacent to the boundaries of the unit or in saddles across ridgetops.

Permeability of the Clarksville soil is moderately rapid,

and surface runoff is medium. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content of the surface layer inhibits the use of tillage machinery. The potential root zone is deep.

Large areas of this soil are in woodland and large areas are used for pasture or meadow. A small acreage is used for wheat. This soil is suited to pasture. It is also suitable for orchards and vineyards. If the soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the soil and grass in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. Restricted use of mechanical tree planting equipment and site preparation equipment are limitations. Planting seedlings by hand or direct seeding may be needed. Seedling mortality is a concern. Planting special stock of larger size than usual may be necessary to achieve better survival.

This soil has no limitations as sites for dwellings. Septic tank absorption fields function adequately if they are properly designed and installed. Frost action is a limitation for local roads and streets, but this limitation can be overcome by grading the roads to shed water and constructing adequate side ditches and culverts.

The capability subclass is IVs, and the woodland ordination symbol is 4f.

9D—Clarksville very cherty silt loam, 9 to 14 percent slopes. This deep, strongly sloping, somewhat excessively drained soil is in highly dissected areas. It is on side slopes that follow the ridge pattern or on narrow ridgetops. It is also on the lower parts of slopes in areas that are not so highly dissected. Slopes are mostly convex. Areas are much longer than wide and range from 6 to several hundred acres.

Typically, the surface layer is brown very cherty silt loam about 2 inches thick. The subsurface layer is yellowish brown very cherty silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown very cherty silt loam, and the lower part is strong brown very cherty silty clay loam. In places the upper part of the subsoil has less chert and is clay.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Captina or Wilderness soils. These soils have fragipans and are in concave positions adjacent to the boundaries of the unit or in saddles across ridgetops.

Permeability of the Clarksville soil is moderately rapid, and surface runoff is medium. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content of the surface layer inhibits the use of tillage machinery. The potential root zone is deep.

Large areas of this soil are in woodland. A large acreage is used for pasture or meadow, and a small acreage is used for wheat. This soil is suited to pasture. It is also suitable for orchards and vineyards. If the soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the grass and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. There are no major hazards or limitations, but mechanical tree planting equipment or site preparation equipment is restricted because of the chert content (fig. 12). Planting seedlings by hand or direct seeding may be needed. Seedling mortality is a concern. Planting special stock of larger size than usual may be necessary to achieve better survival.

This soil has limitations for dwellings and septic tank absorption fields because of slope. Land shaping may be needed, or the buildings and filter fields can be designed to conform to the steeper slopes. Local roads and streets are limited because of slope and frost action. Some cut and fill may be necessary, or the roads can be designed across the slope. Damage caused by frost action can be overcome by grading the roads to shed water and constructing adequate side ditches and culverts.

The capability subclass is VIs, and the woodland ordination symbol is 4f.

9F—Clarksville very cherty silt loam, 14 to 35 percent slopes. This deep, moderately steep and steep, somewhat excessively drained cherty soil is in highly dissected areas on side slopes that follow the ridge pattern and on the lower parts of slopes in areas that are not so highly dissected. Slopes are mostly convex. Areas are much longer than wide and range from 6 to several hundred acres.

Typically, the surface layer is brown very cherty silt loam about 5 inches thick. The subsurface layer is pale brown very cherty silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is multicolored very cherty silty clay loam, and the lower part is red, very firm very cherty clay. In some places the upper part of the subsoil has less chert and is clay. In other places the slope is less than 14 percent.

Permeability of this Clarksville soil is moderately rapid, and surface runoff is rapid. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content of the surface inhibits the use of tillage machinery. The potential root zone is deep.

Figure 12. Chert on the surface of Clarksville very cherty silt loam, 9 to 14 percent slopes.

Most areas of the soil are in woodland. Several areas are used for pasture. This soil is suited to pasture. It is also suitable for orchards and vineyards. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the grass in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees, but seedling mortality is a concern. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival. Steep slopes and chert content restrict the use of equipment. Roads and skid trails should be located on the contour. Yarding the logs uphill to logging roads or skid trails may be required on the steeper slopes. Planting seedlings by hand or direct seeding may be needed.

This soil has limitations for dwellings and septic tank absorption fields because of slope. Extensive land shaping is needed to modify the slope, or dwellings and filter fields can be designed to conform to the natural slope. Slope and frost action are limitations for local roads and streets. Cuts and fills can be minimized by designing the roads across the slopes or on the contour. Grading the roads to shed water and constructing culverts in low places help to prevent damage caused by frost action.

The capability subclass is VIIs, and the woodland ordination symbol is 4f.

10D—Clarksville stony silt loam, 5 to 14 percent slopes. This deep, moderately sloping or strongly sloping, somewhat excessively drained, stony soil is mainly in highly dissected areas. It is on narrow ridgetops, the narrow points of ridgetops, and side slopes that follow the ridge pattern. It is also on the lower parts of slopes in areas that are not so highly

dissected. Slopes are mostly convex. Areas are elongated and range from 6 to several hundred acres.

Typically, the surface layer is dark grayish brown stony silt loam about 6 inches thick. The subsurface layer is brown and yellowish brown very cherty silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown very cherty silty clay loam, and the lower part is red very cherty clay and clay. In places the upper part of the subsoil has less chert and is clay. In other places, the surface layer is cherty silt loam.

Included with this soil in mapping and making up 1 to 15 percent of the unit are areas of Captina or Wilderness soils. These soils have fragipans and are in concave positions adjacent to the boundaries of the unit or in saddles across ridgetops.

Permeability of the Clarksville soil is moderately rapid, and surface runoff is medium. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The stone content inhibits the use of machinery. The potential root zone is deep.

Most areas of this soil are in woodland. This soil is suited to pasture, and it is also suitable for orchards and vineyards. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the soil and pasture in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees, but the use of mechanical tree planting equipment or site preparation equipment is restricted. Planting seedlings by hand or direct seeding may be needed. Seedling mortality is a concern. Planting special stock of larger size than usual may be necessary to achieve better survival.

This soil has limitations for dwellings and septic tank absorption fields because of slope. Land shaping is needed to modify the slope, or buildings and filter fields can be designed to conform to the steeper slopes. Local roads and streets are limited because of slope and frost action. Some cut and fill may be needed, or the roads can be designed across the slope. Grading the roads to shed water and constructing adequate side ditches and culverts can overcome the damage caused by frost action.

The capability subclass is VIs, and the woodland ordination symbol is 4x.

10F—Clarksville stony silt loam, 14 to 35 percent slopes. This deep, moderately steep and steep, somewhat excessively drained, stony soil is in highly dissected areas. It is also on the lower parts of slopes in areas that are not so highly dissected. Slopes are mostly convex. Areas are elongated and range from 6 to several hundred acres.

Typically, the surface layer is brown stony silt loam about 2 inches thick. The subsurface layer is yellowish brown very cherty silt loam about 9 inches thick. The strong brown subsoil extends to a depth of 60 inches or more. It is very cherty silt loam and very cherty silty clay loam. In places the upper part of the subsoil has less chert and is clay. In other places the surface layer is cherty silt loam.

Permeability of the Clarksville soil is moderately rapid, and surface runoff is rapid. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The potential root zone is deep. The stone content inhibits the use of machinery.

Most areas of this soil are in woodland, but a small acreage is in pasture. This soil is suited to pasture. It is also suitable for orchards and vineyards. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the soil and pasture in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. Seedling mortality is a concern. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival. The use of mechanical tree planting equipment or site preparation equipment is restricted on this soil. Planting seedlings by hand or direct seeding may be needed.

This soil has limitations for dwellings and septic tank absorption fields because of slope. Extensive land shaping is needed to modify the slope, or dwellings and filter fields can be designed to conform to the natural slope. Slope and frost action are limitations for local roads and streets. Cuts and fills can be minimized by designing the roads across the slope or on the contour. Grading the roads to shed water and constructing culverts in low places help to prevent damage caused by frost action.

The capability subclass is VIIs, and the woodland ordination symbol is 4x.

11—Crowley silt loam. This nearly level, somewhat poorly drained soil is on narrow and broad natural levees. Areas are elongated and some are irregular in shape. They range from 10 to several hundred acres.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is gray silt loam about 2 inches thick. The subsoil is grayish brown and gray, mottled, firm silty clay loam that extends to a depth of 60 inches or more. In places the subsoil is silty clay loam.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Houlka and Foley

soils. Houlka soils have more clay throughout and are in slightly depressional areas. Foley soils have high sodium content in the subsoil and are at a slightly higher elevation.

Permeability and surface runoff are very slow in the Crowley soil. Available water capacity is high. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The friable surface layer is in good tilth and is easily worked. It tends to crust and puddle, however, if worked when wet or after hard rains. A seasonal high water table, which is 0.5 foot to 1.5 feet below the surface, limits root development. Shrink-swell potential is high.

Most areas of this soil are cultivated, but several areas are used for pasture or timber. This soil is suited to soybeans, wheat, grain sorghum, cotton, rice, irrigated corn, vegetables, and selected grasses and legumes for pasture and hay (fig. 13). Except in areas where potholes occur, excess surface water can generally be removed by installing a system of field and lateral ditches. Land grading helps to eliminate potholes, improves surface drainage, and provides a suitable grade for irrigation. Residue management that leaves large amounts of protective surface cover helps to reduce surface crusting and improve fertility and water intake.

Areas used for pasture or hay generally are small. This soil is easily compacted if grazed or worked when it is wet. Grazing when the soil is wet also causes poor tilth and reduces the stand of grasses. Proper stocking rates, timely delay of grazing, and deferment of hay cutting during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown.

Figure 13. Rice nearing maturity on Crowley silt loam.

This soil is suited to trees, and a few small areas remain in native timber. Harvesting should be timed for periods during which the soil is dry or frozen.

This soil has limitations for dwellings because of wetness and high shrink-swell potential. Areas to be used for dwellings can be built up and tile drains installed around foundations and footings to prevent damage caused by excessive wetness. Buildings and dwellings should be designed and constructed with additional reinforcement steel in concrete footings and foundations, and excavated areas should be backfilled with sand or gravel to prevent damage from shrinking and swelling of the soil. Wetness is a limitation for sewage lagoons, but sealing the bottom and berms of lagoons with slowly permeable material can overcome this limitation. The road base needs to be strengthened with suitable base material to prevent damage caused by low strength. Shrink-swell potential and wetness are also limitations. Roadbeds can be constructed on raised, well compacted material, or the water table can be lowered by constructing adequate side ditches and culverts.

The capability subclass is IIIw, and the woodland ordination symbol is 3o.

12C—Doniphan very cherty silt loam, 2 to 9 percent slopes. This gently sloping and moderately sloping, well drained soil is on narrow ridgetops, side slopes, and foot slopes. Most slopes are convex. Areas are much longer than they are wide and range from 7 to several hundred acres.

Typically, the surface layer is dark grayish brown very cherty silt loam about 2 inches thick. The subsurface layer is light yellowish brown very cherty silt loam about 10 inches thick. The upper part of the subsoil is yellowish red cherty silty clay loam. The lower part to a depth of 60 inches or more is red and brownish yellow, mottled clay. In places the upper part of the subsoil has less clay and contains more chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Bardley, Captina, Gatewood, and Wilderness soils. The moderately deep Bardley and Gatewood soils are intermingled throughout. The Captina and Wilderness soils have fragipans and are on foot slopes.

Permeability of the Doniphan soil is moderate, and surface runoff is medium. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content inhibits the use of tillage machinery. The potential root zone is deep. Shrink-swell potential is moderate.

More than half of the acreage of this soil is used for pasture or meadow. A large acreage is in woodland, and a small acreage is used for wheat. This soil is suited to pasture. It is also suitable for orchards and vineyards. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the soil and grass in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. Restricted use of mechanical tree planting equipment and site preparation equipment are limitations. Planting seedlings by hand or direct seeding may be needed. Seedling mortality is a concern.

This soil is suitable for building sites and onsite waste disposal, but it is limited for dwellings because of shrink-swell potential. Additional reinforcement steel should be placed in concrete footings, foundations, and basement walls, and excavated areas should be backfilled with sand or gravel. Slow permeability is a limitation for septic tank absorption fields, but increasing the length of the lateral field can overcome this limitation. Local roads and streets can be strengthened by adding suitable material to prevent damage caused by low strength. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action and shrinking and swelling of the soil.

The capability subclass is IIIs, and the woodland ordination symbol is 4f.

12D—Doniphan very cherty silt loam, 9 to 14 percent slopes. This strongly sloping, well drained soil is in highly dissected areas. It is on side slopes that follow the ridge pattern or on narrow ridgetops. The soil is also on the lower parts of slopes in areas that are not so highly dissected. Slopes are mostly convex. Areas are much longer than they are wide and range from 7 to several hundred acres.

Typically, the surface layer is very dark grayish brown very cherty silt loam about 4 inches thick. The subsurface layer is yellowish brown very cherty silt loam about 5 inches thick. The subsoil is red clay that extends to a depth of 60 inches or more. In places the upper part of the subsoil has less clay and contains more chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Bardley, Captina, Gatewood, and Wilderness soils. The moderately deep Bardley and Gatewood soils are intermingled throughout. The Captina and Wilderness soils have fragipans and are on low slopes.

Permeability of the Doniphan soil is moderate, and surface runoff is medium. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content inhibits the use of tillage machinery. The potential root zone is deep. Shrink-swell potential is moderate.

More than half of the acreage of this soil is used for pasture or meadow. A large acreage is in woodland, and a small acreage is used for wheat. This soil is suited to

pasture. It is also suitable for orchards and vineyards. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the soil and grass in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. Restricted use of mechanical tree planting equipment and site preparation equipment are limitations. Planting seedlings by hand or direct seeding may be needed. Seedling mortality is a concern.

This soil is suitable for building sites and onsite waste disposal, but it is limited for dwellings because of shrink-swell potential and slopes. Additional reinforcement steel should be placed in concrete footings, foundations, and basement walls, and excavated areas should be backfilled with sand or gravel. Some land shaping may be needed, or dwellings can be designed to conform to the natural slope. Slow permeability and slope are limitations for septic tank absorption fields. These limitations can be overcome by land shaping or by installing laterals across the slope and increasing the length of the lateral field. Local roads and streets can be strengthened by adding suitable material to prevent damage caused by low strength. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action and shrinking and swelling of the soil. Some cuts and fills may be necessary because of slope.

The capability subclass is IVs, and the woodland ordination symbol is 4f.

12F—Doniphan very cherty silt loam, 14 to 35 percent slopes. This moderately steep and steep, well drained soil is in highly dissected areas on side slopes that follow the ridge pattern. It is also on the lower parts of slopes in areas that are not so highly dissected. Slopes are mostly convex. Areas are much longer than they are wide and range from 20 to several hundred acres.

Typically, the surface layer is dark grayish brown very cherty silt loam about 4 inches thick. The subsurface layer is strong brown cherty silt loam about 4 inches thick. The yellowish red clay subsoil extends to a depth of 60 inches or more. In places the upper part of the subsoil has less clay and contains more chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Bardley, Captina, and Wilderness soils. The moderately deep Bardley soil is intermingled throughout the unit. The Captina and Wilderness soils have fragipans and are on low slopes.

Permeability of the Doniphan soil is moderate, and surface runoff is rapid. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The chert content inhibits the use of tillage machinery. The potential root zone is deep. Shrink-swell potential is moderate.

The largest acreage of this soil is in timber; however, a large acreage is used for pasture. This soil is suited to pasture. It is also suitable for orchards and vineyards. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases weed growth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. The hazard of erosion, restricted use of equipment, and seedling mortality are limitations. Special erosion control measures are required, including careful design and construction of roads and skid trails to minimize the steepness and length of slope and concentration of water. Seeding disturbed areas may be necessary after harvesting is completed. Seedling mortality is a concern. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival of seedlings. The steep slopes are a safety hazard for use of equipment. Roads and skid trails should be placed on the contour. Very steep areas may require the yarding of logs uphill to logging roads or skid trails. Planting seedlings by hand or direct seeding may be needed.

Steep slopes are limitations for building sites and onsite waste disposal. Extensive land shaping is needed to modify the slope, or dwellings and absorption fields can be designed to conform to the natural slope. Extra reinforcement should be placed in footings and foundations, and excavated areas should be backfilled with sand or gravel to help prevent damage caused by shrinking and swelling of the soil. Slope, low strength, frost action, and shrink-swell potential are limitations for local roads and streets. Cuts and fills can be minimized by designing roads across the slope or on the contour. Roads can be strengthened by adding suitable material. Grading the roads to shed water and constructing culverts in low places help to prevent damage caused by frost action and shrinking and swelling of the soil.

The capability subclass is VIs, and the woodland ordination symbol is 4f.

13D—Doniphan stony silt loam, 5 to 14 percent slopes. This moderately sloping and strongly sloping, well drained soil is on narrow ridgetops and side slopes that follow the ridge pattern. Most slopes are convex. Areas are circular or elongated and range from 6 to 100 acres.

Typically, the surface layer is dark grayish brown stony silt loam about 3 inches thick. The subsurface layer is light yellowish brown very cherty silt loam about 6 inches thick. The subsoil is red clay that extends to a depth of 60 inches or more. In places the upper part of the subsoil has less clay and contains more chert.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of intermingled, moderately deep Bardley and Gatewood soils.

Permeability of the Doniphan soil is moderate, and surface runoff is medium. Available water capacity is low. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility and the organic matter content are low. The stony surface inhibits the use of machinery. The potential root zone is deep. Shrink-swell potential is moderate.

Most areas of this soil are in woodland. A few areas are used for pasture. If this soil is used for pasture, overgrazing reduces the stand of grasses and increases growth of weeds. Pasture rotation, timely deferment of grazing, and proper stocking rates help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. Large stones are a limitation for use of mechanical tree planting equipment or site preparation equipment. Planting seedlings by hand or direct seeding may be necessary.

This soil is suitable for building sites and onsite waste disposal, but it is limited for dwellings because of shrink-swell potential and slope. Additional reinforcement steel should be placed in concrete footings, foundations, and basement walls, and excavated areas should be backfilled with sand or gravel. Some land shaping may be needed, or dwellings can be designed to conform to the natural slope. Slow permeability, slope, and stones are limitations for septic tank absorption fields, but land shaping or installing laterals across the slope and increasing the length of the lateral field helps to overcome these limitations. Stones can be removed with a bulldozer. Local roads and streets can be strengthened by adding suitable base material to prevent damage caused by low strength. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action and shrinking and swelling of the soil. Some cuts and fills may be necessary because of slope.

The capability subclass is VIs, and the woodland ordination symbol is 4x.

14B—Dubbs silt loam, 0 to 5 percent slopes. This nearly level and gently sloping, well drained soil is on long, narrow natural levees adjacent to old sloughs and major streams. Areas are linear and range from 5 to 200 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is very friable silt loam that extends to a depth of 60 inches or more. It is brown and strong brown in the upper part; strong brown and mottled in the middle part; and yellowish brown and mottled in the lower part.

Included with this soil in mapping are poorly drained soils in old sloughs. In places a somewhat poorly drained soil is in narrow bands adjacent to the boundaries of the unit. These areas make up about 5 to 15 percent of the unit.

Permeability of the Dubbs soil is moderate, and surface runoff is slow. The available water capacity is high. Reaction of the subsoil ranges from medium acid to very strongly acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. This soil is easy to keep in good tilth. The shrink-swell potential is moderate.

Most areas of this soil are farmed. A few acreages are in timber and pasture. This soil is suited to wheat, soybeans, cotton, grain sorghum, vegetables, and corn. It is also suited to grasses and legumes for hay and pasture. If this soil is used for cultivated crops, erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. Returning crop residue or the regular addition of organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well.

This soil is suited to trees, and a few small areas remain in woodland. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed by careful and thorough site preparation. Such preparation may include prescribed burning, spraying, girdling, or cutting. Release treatments may be needed to ensure development.

This soil is suitable for use as building sites, onsite waste disposal, and for local roads and streets. Septic tank absorption fields function satisfactorily if properly designed and installed.

The capability subclass is IIe, and the woodland ordination symbol is 2o.

15—Foley silt loam. This nearly level, poorly drained soil is on long, narrow natural levees that are on higher positions than most of the surrounding landscape. These soils are high in content of sodium. Areas are somewhat elongated and irregular in shape. They range from 5 to 200 acres or more.

Typically, the surface layer is brown silt loam about 4 inches thick, and the subsurface layer is light brownish gray silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is light brownish gray, mottled, firm silty clay loam except for the upper layer, which is silt loam.

Included with this soil in mapping and making up 5 to 15 percent of the unit are areas of Lafe and Calhoun

soils. The somewhat poorly drained Lafe soils are on higher positions than Foley soil. The Calhoun soils do not have sodium and are in lower positions.

Permeability of the Foley soil is very slow, and surface runoff is slow. The available water capacity is moderate. Reaction ranges from strongly acid in the surface layer to strongly alkaline in the lower part of the subsoil. It varies widely in the surface layer as a result of local liming practices. Organic matter content is low, and natural fertility is medium. The surface layer is friable and easily tilled. The soil tends to puddle and crust after a hard rain, however, if it is tilled when wet. Root development is restricted by soil layers high in content of sodium. A perched water table is near the surface or it is within 1 foot of the surface during wet periods. Shrink-swell potential is moderate.

Most areas of this soil are farmed. A few acreages are in pasture and timber. This soil is suited to wheat, soybeans, cotton, grain sorghum, corn, and vegetables. If the soil is used for cultivated crops, returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, wetness and layers of soil that have high sodium content restrict the growth of deep-rooted hay and pasture crops. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is suited to trees, and a few small areas remain in native timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods during which the soil is dry or frozen. Once seedlings are established, they grow well; however, seedling mortality is a concern. Ridging the soil and planting on the ridges helps to increase seedling survival. Plant competition can be reduced by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting.

This soil has limitations for building site development because of wetness and shrink-swell potential. Areas used as sites for dwellings can be built up and drainage tile installed around the footings to prevent damage caused by excessive wetness. Additional reinforcement should be placed in footings and foundations, and excavated areas should be backfilled with sand or gravel to help prevent damage caused by shrinking and swelling of the soil. Sewage lagoons will function satisfactorily if properly designed and installed. The bottom and berms of the lagoon may need sealing to prevent contamination of ground water. Wetness, frost action, and low strength are limitations for local roads and streets. Roads can be constructed on raised, well compacted fill material or the water table can be lowered by installing side ditches and culverts. Roads can be strengthened by adding suitable base material.

The capability subclass is IIIw, and the woodland ordination symbol is 3w.

16D—Gasconade-Rock outcrop complex, 2 to 14 percent slopes. This complex consists of gently sloping to strongly sloping, somewhat excessively drained Gasconade soils and Rock outcrop. It is on narrow ridgetops and side slopes and extends into the heads of small drainageways. Areas are irregular in shape and range from 6 to 40 acres. This unit is about 70 percent Gasconade soil and 15 percent Rock outcrop. The Gasconade soil and Rock outcrop are in such an intermingled pattern that it is not practical to separate them in mapping.

Typically, the Gasconade soil has a very dark grayish brown, flaggy silty clay loam surface layer about 4 inches thick. The subsoil is very dark grayish brown, flaggy silty clay loam about 4 inches thick. The subsoil is underlain by hard limestone bedrock at a depth of 8 inches. In places the subsoil is less than 35 percent clay.

The Rock outcrop part of the complex consists of flat, nearly horizontal exposures of limestone (fig. 14). These exposures are a few square feet to several square yards and have vertical ledges. The ledges are several feet to more than 100 feet in length and about 1 foot to 4 feet in height.

Included with this complex in mapping and making up 1 to 10 percent of the unit are small areas of moderately deep Gatewood and Bardley soils. These soils are intermingled throughout.

Permeability of the Gasconade soil is moderately slow, and surface runoff is rapid. The available water capacity is low. Reaction in the soil ranges from slightly acid to mildly alkaline. Natural fertility is medium, and the organic matter content is moderate. Because of shallow depth to bedrock and Rock outcrop, this soil is not easily tilled. Root development is restricted because of shallow depth to bedrock. Shrink-swell potential is moderate.

Most areas of this complex are in native grasses. Several areas are in cedar trees. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Mechanical equipment can be used to control woody vegetation. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

The Gasconade soil is poorly suited to trees because of shallow depth to bedrock and droughtiness; however, cedar trees grow well on this soil. Restricted use of mechanical tree planting equipment or site preparation equipment is a limitation. Planting seedlings by hand or direct seeding may be needed. Once seedlings are established, they grow well; however, seedling mortality

Figure 14. Rock outcrop in an area of Gasconade-Rock outcrop complex, 2 to 14 percent slopes.

is a concern. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival of seedlings. Lighter, less intensive, more frequent thinnings to reduce stand density may be needed to minimize the damage from windthrow.

The Gasconade soil is poorly suited to building site development and sewage lagoons because of shallow depth to bedrock, seepage, and large stones. Some areas, however, are used for building sites. Rock can be excavated for dwellings. Areas for sewage lagoons can be built up by hauling in slowly permeable material. A properly designed and constructed septic tank absorption field mound system should function adequately. Bedrock and large stones are limitations for local roads and streets. Roads should be built across the slope where possible to minimize the amount of excavation and slope. Subgrade can be hauled in or the rock blasted out.

The capability subclass is VIs, and the woodland ordination symbol is 5d.

16F—Gasconade-Rock outcrop complex, 14 to 30 percent slopes. This complex consists of moderately steep and steep, somewhat excessively drained Gasconade soils and Rock outcrop. It is on side slopes. Areas are irregular in shape and range from 6 to 40 acres. This unit is about 50 percent Gasconade soil and 35 percent Rock outcrop. The Gasconade soil and Rock outcrop are in such an intermingled pattern that it is not practical to separate them in mapping.

Typically, the Gasconade soil has a very dark grayish brown, flaggy silty clay loam surface layer about 7 inches thick. The subsoil is very dark grayish brown, flaggy silty

clay loam about 13 inches thick. The subsoil is underlain by hard limestone bedrock at a depth of 20 inches. In places the subsoil is less than 35 percent clay. In other places the subsoil is clay.

The Rock outcrop part of the complex consists of flat, nearly horizontal steps and vertical ledges 4 feet to more than 25 feet in height. Some large, loose boulders range to 4 feet in height.

Included with this complex in mapping and making up 5 to 10 percent of the unit are areas of moderately deep Bardley soils. These soils are intermingled throughout.

Permeability of the Gasconade soil is moderately slow, and surface runoff is rapid. The available water capacity is low. Reaction of the solum ranges from slightly acid to mildly alkaline. Natural fertility is medium, and the organic matter content is moderate. Because of shallow depth to bedrock and Rock outcrop, this unit is not easily tilled. Root development is restricted because of shallow depth to bedrock. Shrink-swell potential is moderate.

Most areas of this complex are in native grasses. Several areas are in cedar trees. The Gasconade soil is suited to pasture. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

The Gasconade soil is poorly suited to most trees because of shallow depth to bedrock and droughtiness. Cedar trees, however, grow well on this soil. Restricted use of equipment is a limitation. Steep slopes are a safety hazard for equipment use. Roads and skid trails should be located on the contour. Very steep areas may require the yarding of logs uphill to logging roads or skid trails. Planting seedlings by hand or direct seeding may be needed. Once seedlings are established, they grow well; however, seedling mortality is a concern. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival of seedlings. Lighter, less intensive, more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

The Gasconade soil is poorly suited to building site development and sewage lagoons because of steep slopes, shallow depth to bedrock, seepage, and large stones. Some areas, however, are used for building sites. Dwellings can be designed to conform to the natural slope of the land. Rock can be excavated. A properly designed and constructed septic tank absorption field mound system should function adequately. Bedrock, large stones, and steep slopes are limitations for local roads and streets. Roads should be built across the slope where possible to minimize the amount of excavation and slope. Subgrade can be hauled in or the rock blasted out.

The capability subclass is VIIs, and the woodland ordination symbol is 5d.

17C—Gatewood cherty silt loam, 2 to 9 percent slopes. This gently sloping and moderately sloping, moderately well drained soil is on ridgetops and side slopes. Areas are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is pale brown, mottled silt loam about 3 inches thick. The subsoil is yellowish brown, firm clay in the upper part; yellowish brown, mottled clay in the middle part; and brownish yellow, mottled clay in the lower part. It is underlain by hard dolomite bedrock at a depth of about 36 inches.

Included with this soil in mapping are small areas of well drained Bardley soils and shallow, somewhat excessively drained Gasconade soils. These soils are on the more steeply sloping areas and in areas where bedrock crops out. They make up about 5 to 10 percent of the unit.

Permeability of the Gatewood soil is slow, and surface runoff is medium. The available water capacity is low. Reaction of the subsoil is medium acid or strongly acid. Reaction of the surface layer varies as a result of local liming practices. Natural fertility is medium, but the organic matter content is low. The chert content of the surface layer inhibits the use of tillage machinery. Root development is restricted because of moderate depth to bedrock. Shrink-swell potential is high.

Most areas of this soil are used for pasture, but several acreages are in timber. This soil is suited to wheat and grasses and legumes for pasture and hay. Overgrazing or grazing when the soil is wet, however, causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is poorly suited to most trees because of droughtiness; however, cedar trees grow well. Equipment limitations and seedling mortality and windthrow are management concerns. It may be necessary to plant by hand because of the cherty surface. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival of seedlings. Lighter, less intensive, more frequent thinnings to reduce stand density may be needed to minimize the damage from windthrow.

This soil has limitations for building site development and for sewage lagoons because of depth to rock and high shrink-swell potential. The bedrock can be excavated. Additional reinforcement steel should be placed in concrete footings, foundations, and basement walls, and excavated areas should be backfilled with

sand or gravel to prevent damage caused by shrinking and swelling of the soil. Areas for sewage lagoons should be built up with slowly permeable material. Local roads and streets can be strengthened by adding suitable material to prevent damage caused by low strength. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action and shrinking and swelling of the soil.

The capability subclass is IVs, and the woodland ordination symbol is 5c.

18B—Hartville silt loam, 1 to 4 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on foot slopes and second bottoms along the valleys of major streams. It is subject to occasional flooding. Slopes are both concave and convex. Areas are adjacent to the upland and are somewhat narrow and irregular in shape. They range from 6 to 20 acres.

Typically, the surface layer is brown, very friable silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown and dark yellowish brown, mottled silty clay loam, and the lower part is mottled, grayish brown and strong brown, firm silty clay and light brownish gray, mottled, firm silty clay loam.

Included with this soil in mapping and making up 5 to 10 percent of the unit are several small areas that have less clay in the subsoil. They are along the boundaries of the mapped areas and are adjacent to the upland. Small areas of a poorly drained soil are intermingled in concave, seepy positions.

Permeability of the Hartville soil is slow, and surface runoff is medium. A few areas are intermittently ponded. Available water capacity is high. Reaction in the subsoil ranges from very strongly acid to slightly acid. Reaction of the surface layer varies widely as a result of local liming practices. The organic matter content is low, and natural fertility is medium. This soil is easy to keep in good tilth. A seasonal high water table, which is 1.5 to 3 feet below the surface, limits root development and penetration. Shrink-swell potential is high.

Most of the acreage of this soil is used for pasture or meadow. A few acreages are used for wheat. Several areas are still in timber. This soil is suited to vegetables, wheat, and cultivated crops. If this soil is used for cultivated crops, erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. Returning crop residue or the regular addition of organic material helps to improve fertility, reduce crusting, and increase water infiltration. Flooding is a hazard if this soil is used for cultivated crops. Damage from floods can be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged.

If this soil is used for grasses and legumes for pasture, occasional flooding is a hazard. Plants that tolerate wet conditions are suitable for pasture and hay production. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

This soil is suited to trees, and several small areas remain in timber. Seedling mortality and windthrow are management concerns. Planting special stock of larger size than usual may be necessary to achieve better survival. Lighter, less intensive, more frequent thinnings to reduce stand density may be needed to minimize the damage from windthrow.

This soil generally is unsuited to sanitary facilities and building site development because of occasional flooding and severe wetness.

The capability subclass is IIw, and the woodland ordination symbol is 5c.

19—Hontas silt loam. This nearly level, moderately well drained soil is on bottom lands along the valleys of the major streams. It is subject to occasional flooding. Areas are elongated and range from 5 to 200 acres.

Typically, the surface layer and subsurface layer are brown silt loam about 16 inches thick. The subsoil is brown, mottled, friable silt loam about 19 inches thick. The substratum is grayish brown, mottled silt loam and light brownish gray, mottled silty clay loam to a depth of 60 inches or more. In places the lower part of the subsoil is cherty.

Included with this soil in mapping and making up 5 to 10 percent of the unit are narrow bands of poorly drained Calhoun soils in slight depressions.

Permeability of the Hontas soil is moderate, and surface runoff from cultivated areas is slow. The available water capacity is high. Reaction in the subsoil ranges from medium acid to mildly alkaline. Reaction of the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. A seasonal high water table, which is 2 to 2.5 feet below the surface during the spring and fall, may delay tillage operations and restrict root development.

Most areas of this soil are used for pasture or hay. A few areas are used for cultivated crops, wheat, or timber. This soil is suited to grain sorghum, soybeans, wheat, and vegetables. It is also suited to grasses and legumes for hay and pasture. If the soil is used for cultivated crops, flooding is a hazard. The risk of flood damage may be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Returning crop residue or the regular addition of organic material helps to improve fertility, reduce crusting, and increase water infiltration.

Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Plants that tolerate some wetness should be grown.

This soil is suited to trees, and a few small areas remain in timber. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed by careful and thorough site preparation. Such preparation may include prescribed burning, spraying, girdling, or cutting.

This soil generally is unsuitable for building site development and sanitary facilities because of occasional flooding.

The capability subclass is IIw, and the woodland ordination symbol is 2o.

20—Houlka silty clay loam. This nearly level, somewhat poorly drained soil is in narrow to broad basins on natural levees or low terraces. It is subject to occasional flooding in most places. Areas are linear and irregular in shape. They range from 10 to several hundred acres.

Typically, the surface layer is dark grayish brown silty clay loam about 7 inches thick. The subsoil is about 45 inches thick. The upper part is grayish brown, firm silty clay loam, and the lower part is grayish brown, mottled, very firm silty clay. The substratum to a depth of 60 inches or more is olive gray, mottled, very firm silty clay.

Included with this soil in mapping and making up 5 to 10 percent of the unit are areas of somewhat poorly drained Crowley soil on higher positions. Also included are many small ponded areas of Houlka soils.

Permeability of the Houlka soil is very slow, and surface runoff is very slow. The available water capacity is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Reaction in the surface layer varies widely as a result of local liming practices. The organic matter content is moderate, and natural fertility is medium. A seasonal high water table, which is 1 foot to 2 feet above the surface, limits root penetration. Shrink-swell potential is high.

Most areas of this soil are used for cultivated crops. A few small areas are used for pasture or timber. This soil is suited to soybeans, corn, cotton, grain sorghum, rice, vegetables, and wheat. Most areas that are used for cultivated crops are subject to flooding. Some areas are protected by levees. Damage from floods can be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Field and drainage ditches can be installed to dispose of excess water. Land grading aids drainage and provides suitable grade for irrigation. If the soil is used for cultivated crops, returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, wetness is a problem. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown.

This soil is suited to trees, and a few small areas remain in native timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods when the soil is dry or frozen. Severe seedling mortality is a concern. Ridging the soil and planting on the ridges helps to increase seedling survival. Lighter, more frequent thinnings to reduce stand density reduce the damage from windthrow. Plant competition can be reduced by thorough site preparation.

This soil generally is unsuitable for sanitary facilities and building site development because of occasional flooding.

The capability subclass is IIw, and the woodland ordination symbol is 1c.

21—Kobel clay. This nearly level, poorly drained soil is in slack water areas on low terraces and natural levees. It is subject to occasional flooding in most places. Areas are elongated and range from 6 to 200 acres.

Typically, the surface layer is dark grayish brown clay about 8 inches thick. The subsoil is dark gray and gray, mottled, very firm clay about 48 inches thick. The substratum to a depth of 60 inches or more is gray, mottled clay. In places the surface layer is silty clay. In other places the subsoil is not so gray and is more acid.

Included with this soil in mapping are small areas of Amagon and Calhoun soils that have surface layers of silt loam and less clay throughout. These soils are on higher positions. Also included are many small ponded areas of Kobel soils. These included areas make up about 5 to 15 percent of the unit.

Permeability of the Kobel soil is very slow, and surface runoff is slow or very slow. The available water capacity is moderate. Reaction in the subsoil is neutral or slightly acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is moderate. This soil is difficult to till and remains wet for long periods in spring and winter. The high water table, which is near the surface or is within 1 foot of the surface, limits root penetration. Shrink-swell potential is high.

Most areas of this soil are farmed. A few small acreages are used for pasture or timber. This soil is suited to corn, soybeans, cotton, wheat, grain sorghum, rice, vegetables, and pasture. Most areas that are used for cultivated crops are subject to flooding. Some areas

are protected by levees. Damage from floods can be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Drainage and field ditches can be installed to dispose of excess water. Land grading aids drainage and provides suitable grade for supplemental irrigation. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

This soil is suited to pasture. Overgrazing or grazing when the soil is wet, however, causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown.

This soil is suited to trees, and a few small areas remain in native timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods during which the soil is dry or frozen. Seedling mortality is a concern. Ridging the soil and planting on the ridges helps to increase seedling survival. Lighter, less intensive, more frequent thinnings to reduce stand density may be necessary to minimize the damage from windthrow. Competing vegetation can be controlled by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting.

This soil generally is unsuitable for building site and sanitary facilities because of occasional flooding and ponding (fig. 15).

The capability subclass is IIIw, and the woodland ordination symbol is 3w.

Figure 15. Ponding on an area of Kobel clay.

22—Lafe silt loam. This nearly level, somewhat poorly drained soil is on elongated or circular, slightly convex or flat terraces. It is also on short side slopes. Areas range from 6 to 50 acres.

Typically, the surface layer is grayish brown silt loam about 5 inches thick. The subsoil to a depth of 60 inches or more is pale brown, mottled, very firm silty clay loam in the upper part and light brownish gray, mottled, very firm and firm silty clay loam in the lower part. In places the upper part of the subsoil is gray.

Included with this soil in mapping and making up about 5 to 15 percent of the unit are intermingled areas of poorly drained Calhoun or Foley soils. They are in the lower positions.

Permeability of the Lafe soil is very slow, and surface runoff is slow or ponded. Available water capacity is low. The surface layer ranges from very strongly acid to slightly acid if unlimed. Natural fertility is medium, and the organic matter content is low. The friable surface layer is in good tilth and is easily worked, but it tends to crust and puddle if worked when wet or after hard rains. A perched water table is near the surface or is within 1 foot of the surface during wet periods. Shrink-swell potential is moderate.

Most areas of this soil are cultivated. A few small areas are used for pasture or timber. Soybeans and grain sorghum are the most widely grown summer annuals. Several acreages are used for wheat. This soil is generally unsuitable for cultivated crops because of high sodium content (fig. 16). Because areas seldom are large enough to be managed separately, they are farmed together with the adjacent soils.

This soil is suitable for pasture or hay. Grasses and plants that have shallow root systems generally survive better than deep-rooted plants. Most pasture plants wilt, and some die during the summer. Grazing when the soil is wet causes compaction and reduces infiltration. Timely delay of grazing and restricted use during wet periods help to keep the plants and soil in good condition.

This soil is poorly suited to trees because of the high sodium content of the subsoil (fig. 17). The few areas remaining in trees are in scrub woodland.

This soil generally is unsuitable for building sites because of wetness and high sodium content.

The capability subclass is VIs. No woodland ordination symbol is assigned.

23B—Loring silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops, side slopes, and foot slopes adjacent to flood plains. Areas are somewhat narrow and elongated and range from 5 to 200 acres.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, very friable silt loam and strong brown, mottled, friable silty clay loam; the next part is multicolored, firm silty clay loam; the lower part is a fragipan of strong brown and yellowish brown, firm and brittle silt loam. In some small areas the slopes are steeper than typical. In other areas the fragipan is cherty silt loam or cherty silty clay loam.

Included with this soil in mapping are small areas of somewhat excessively drained Clarksville soils and well drained Doniphan soils. These soils are on ridge points and breaks adjacent to small drainageways. They make up about 5 to 10 percent of the unit.

Permeability of the Loring soil is moderate above the fragipan and moderately slow through the fragipan. Surface runoff from cultivated areas is medium. The available water capacity is moderate. Reaction in the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. The surface layer is friable and easily tilled through a fairly wide range in moisture content but tends to crust or puddle after hard rains. Root development is restricted below a depth of about 33 inches because of the compact fragipan. A perched water table is above the fragipan during wet periods.

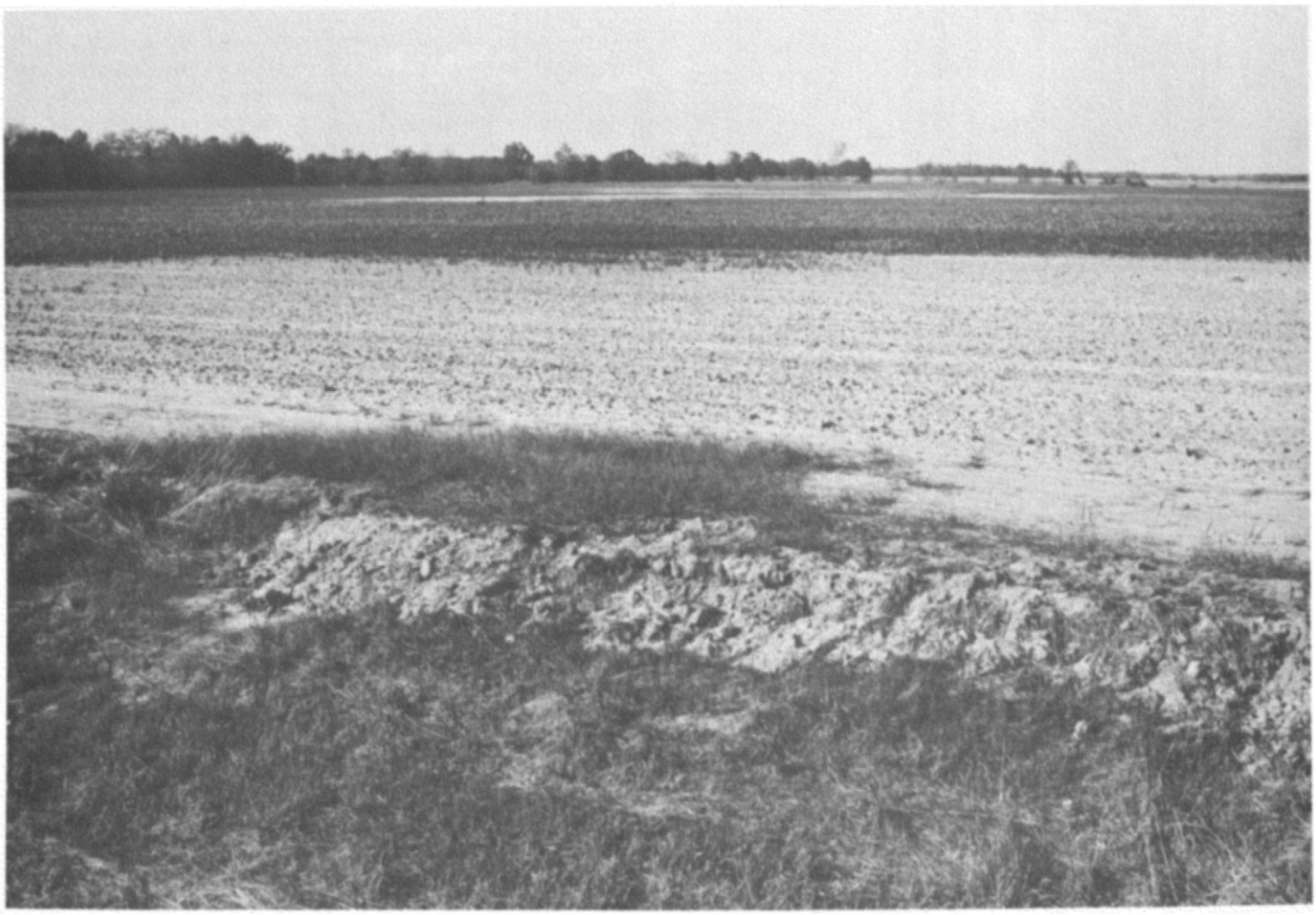


Figure 16. Grazed area of Lafe silt loam. The bare spots are caused by the high content of sodium in the soil.

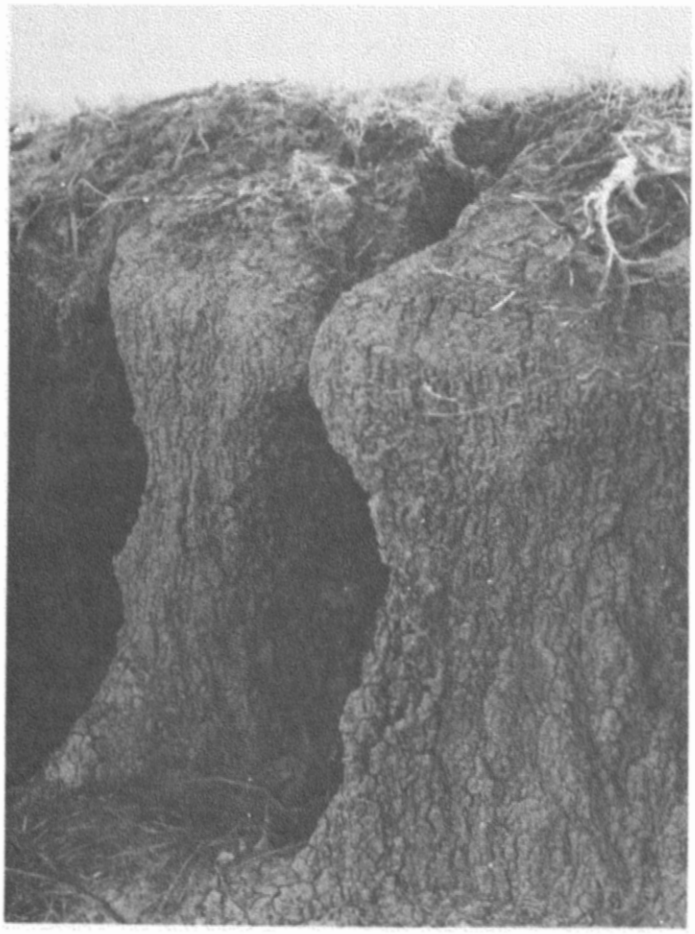


Figure 17. Profile of Lafe silt loam. The structure of the soil is the result of the high sodium content.

Most areas of this soil are used for pasture or meadow. A few areas are used for cultivated crops, wheat, or timber. This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. It is also suitable for orchards and vineyards. If the soil is used for cultivated crops, severe erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas the slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the early spring months.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and onsite waste disposal. Wetness is a limitation for dwellings and small commercial buildings. Foundations, basement walls, and footings should be designed to prevent damage caused by excessive wetness. Adequate treatment, such as sealing the wall and using foundation and footing drains, helps to prevent this damage. Sewage lagoons are limited because of slope, but this limitation can be overcome by leveling an area for a lagoon site. Local roads and streets need to be strengthened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action.

The capability subclass is IIe, and the woodland ordination symbol is 3o.

23B2—Loring silt loam, 2 to 5 percent slopes, eroded. This gently sloping, moderately well drained soil is on convex ridgetops, side slopes, and foot slopes adjacent to flood plains. Areas are somewhat narrow and elongated and range from 5 to 160 acres.

Typically, the surface layer is grayish brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown, friable silty clay loam, and the lower part is a fragipan of yellowish brown and grayish brown, firm and brittle silty clay loam. In places the fragipan is much thinner than typical. In other places numerous small gullies and erosion scars expose the strong brown subsoil. In some small areas slopes are steeper than typical. In other areas the fragipan is cherty silt loam or cherty silty clay loam.

Included with this soil in mapping are small areas of somewhat excessively drained Clarksville soils and well drained Doniphan soils. These soils are on ridge points and breaks adjacent to small drainageways. They make up about 5 to 10 percent of the unit.

Permeability of the Loring soil is moderate above the fragipan and moderately slow through the fragipan. Surface runoff from cultivated areas is medium. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. This soil responds well to the addition of fertilizer and lime. The surface layer is friable and is easily tilled through a fairly wide range in moisture content. It tends to crust or puddle, however, after hard rains, especially in areas where the plow layer contains subsoil material. Root development is restricted below a depth of about 27 inches because of a compact

fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or meadow. A few areas are used for cultivated crops or wheat. This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. It is also suitable for orchards and vineyards. If the soil is used for cultivated crops, further erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas the slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the early spring months.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and onsite waste disposal. Wetness is a limitation for dwellings and small commercial buildings. Foundations, basement walls, and footings should be designed to prevent damage caused by excessive wetness. Adequate treatment, such as sealing the wall and using foundation and footing drains, helps to prevent this damage. Sewage lagoons are limited because of slope, but this limitation can be overcome by leveling an area for a lagoon site. Local roads and streets need to be strenghtened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action.

The capability subclass is IIIe, and the woodland ordination symbol is 3o.

23C—Loring silt loam, 5 to 9 percent slopes. This moderately sloping, moderately well drained soil is on convex ridgetops, side slopes, and foot slopes adjacent to flood plains. Areas are somewhat narrow and elongated and range from 5 to 200 acres.

Typically, the surface layer is dark brown silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 11 inches thick. The subsoil is 45 inches thick and extends to a depth of about 60 inches or more. The upper part is strong brown and yellowish brown, mottled, friable silt loam and firm silty clay loam, and the lower part is a fragipan of light yellowish brown, pale brown, and light brownish gray, firm and brittle silt loam and silty clay loam. In some small areas the slopes are steeper than typical. In other areas the fragipan is cherty silt loam or cherty silty clay loam.

Included with this soil in mapping are small areas of somewhat excessively drained Clarksville soils and well drained Doniphan soils. They are on ridge points and breaks adjacent to small drainageways and make up about 5 to 10 percent of the unit.

Permeability of the Loring soil is moderate above the fragipan and moderately slow through the fragipan. Surface runoff from cultivated areas is medium. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. The surface layer is friable and easily tilled through a fairly wide range of moisture content, but it tends to crust or puddle after hard rains. Root development is restricted below a depth of about 32 inches because of the compact fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or meadow. A few areas are used for cultivated crops, wheat, or timber. This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. It is also suitable for orchards and vineyards. If the soil is used for cultivated crops, severe erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the early spring months.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and onsite waste disposal. Wetness is a limitation for dwellings. Wetness and slope are limitations for small commercial buildings. Foundations, basement walls, and footings should be designed to prevent damage caused by excessive wetness. Adequate treatment, such as sealing the wall and using foundation and footing drains, help to prevent this damage. In addition, some land shaping may be needed for small commercial buildings because of slope. Sewage lagoons are limited because of slope, but this limitation can be overcome by land

shaping or by leveling an area for a lagoon site. Local roads and streets need to be strengthened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action.

The capability subclass is IIIe, and the woodland ordination symbol is 3o.

23C2—Loring silt loam, 5 to 9 percent slopes, eroded. This moderately sloping, moderately well drained soil is on convex ridgetops, side slopes, and foot slopes adjacent to flood plains. Areas are somewhat narrow and elongated and range from 5 to 160 acres.

Typically, the surface layer is brown silt loam about 3 inches thick. The subsoil is about 42 inches thick. The upper part is strong brown and yellowish brown, mottled, firm silty clay loam; the middle part is a fragipan of yellowish brown, firm and brittle silty clay loam; the lower part is brown, firm silty clay loam. The substratum to a depth of about 60 inches is brown, firm silty clay loam. In places numerous small gullies and erosion scars expose the strong brown subsoil. In some small areas slopes are steeper than typical. In other areas the fragipan is cherty silty clay loam.

Included with this soil in mapping are small areas of somewhat excessively drained Clarksville soils and well drained Doniphan soils. These soils are on ridge points and breaks adjacent to small drainageways and make up about 5 to 10 percent of the unit.

Permeability of the Loring soil is moderate above the fragipan and moderately slow in the fragipan. Surface runoff from cultivated areas is medium. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. Because of erosion, the surface layer is not easily tilled. It has a tendency to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material. Root development is restricted below a depth of about 15 inches because of a compact fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or meadow. A few areas are used for cultivated crops, wheat, or timber. This soil is suited to corn, soybeans, small grain, and grasses and legumes for hay and pasture. It is also suitable for orchards and vineyards. If the soil is used for cultivated crops, further erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas the slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the summer months when shortages of rainfall are common. These grasses also tolerate wetness during the early spring months.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and onsite waste disposal. Wetness is a limitation for dwellings. Wetness and slope are limitations for small commercial buildings. Foundations, basement walls, and footings should be designed to prevent damage caused by excessive wetness. Adequate treatment, such as sealing the wall and using foundation and footing drains, help to prevent this damage. In addition, some land shaping may be needed for small commercial buildings because of slope. Sewage lagoons are limited because of slope, but this limitation can be overcome by land shaping or by leveling an area for a lagoon site. Local roads and streets need to be strengthened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action.

The capability subclass is IVe, and the woodland ordination symbol is 3o.

23D—Loring silt loam, 9 to 14 percent slopes. This strongly sloping, moderately well drained soil is on convex side slopes and foot slopes adjacent to flood plains. Areas are somewhat narrow and elongated and range from 10 to 100 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsurface layer is yellowish brown silt loam about 3 inches thick. The subsoil is about 37 inches thick. The upper part is strong brown, friable silt loam and firm silty clay loam, and the lower part is a fragipan of brown, firm and brittle silt loam. The substratum to a depth of 60 inches is brown, friable silt loam. Some small areas are not so steep.

Included with this soil in mapping are small areas of somewhat excessively drained Clarksville soils and well drained Doniphan soils. These soils are on the steeper, sloping areas and make up about 5 to 10 percent of the unit.

Permeability of the Loring soil is moderate above the fragipan and moderately slow in the fragipan. Surface runoff from cultivated areas is medium. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. The surface layer is friable and easily tilled through a fairly wide range in moisture

content, but it tends to crust or puddle after hard rains. Root development is restricted below a depth of about 26 inches because of the compact fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or hay. A few areas are in timber. This soil is suited to small grain, grasses and legumes, and to a limited acreage of row crops, such as grain sorghum and soybeans. It is also suitable for orchards and vineyards. If the soil is used for row crops, erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

The use of this soil for pasture or hay is also effective in controlling erosion. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the early spring months.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and onsite waste disposal. Wetness and slope are limitations for dwellings without basements, and wetness is a limitation for dwellings with basements. Foundations, basement walls, and footings should be designed to prevent damage caused by excessive wetness. Adequate treatment, such as sealing the wall and using foundation and footing drains, help to prevent this damage. Dwellings can be designed to conform to the natural slope of the land. Land shaping may be necessary in some areas. Sewage lagoons are limited because of slope, but this limitation can be overcome by land shaping and leveling a suitable area for a lagoon site or piping sewage to adjacent, more suitable areas. Local roads and streets need to be strengthened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action. Some cuts and fills may be necessary because of slope.

The capability subclass is IVe, and the woodland ordination symbol is 3o.

23D2—Loring silt loam, 9 to 14 percent slopes, eroded. This strongly sloping, moderately well drained soil is on convex side slopes and foot slopes adjacent to flood plains. Areas are somewhat narrow and elongated and range from 10 to 100 acres.

Typically, the surface layer is dark yellowish brown silt loam about 3 inches thick. The subsoil is about 57 inches thick. The upper part is yellowish brown and strong brown, mottled, firm silty clay loam; the middle part is a fragipan of strong brown, mottled, firm and brittle silty clay loam; the lower part to a depth of about 60 inches is strong brown, firm silty clay loam. There are small areas that are less sloping than typical and numerous small gullies and erosion scars where the strong brown subsoil is exposed.

Included with this soil in mapping are small areas of somewhat excessively drained Clarksville soils and well drained Doniphan soils. These soils are on the steeper areas and make up about 5 to 10 percent of the unit.

Permeability of the Loring soil is moderate above the fragipan and moderately slow in the fragipan. Surface runoff from cultivated areas is medium. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. Because of erosion, the surface layer is not easily tilled. It has a tendency to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material. Root development is restricted below a depth of about 22 inches because of the compact fragipan. A perched water table is above the fragipan during wet periods.

Most areas of this soil are used for pasture or hay. A few areas are in timber. This soil is suited to pasture or hay. It is also suitable for orchards and vineyards.

The use of this soil for pasture or hay is effective in controlling erosion. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common. These grasses also tolerate wetness during the early spring months.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and onsite waste disposal. Wetness and slope are limitations for dwellings without basements, and wetness is a limitation for dwellings with basements. Foundations, basement walls, and footings should be designed to prevent damage caused by excessive wetness. Adequate treatment, such as sealing the wall and using foundation and footing drains, helps to prevent this damage. Dwellings can be designed to conform to the natural slope of the land. Land shaping may be necessary in some areas. Sewage lagoons are limited because of slope, but this limitation can be overcome by land shaping and leveling a suitable area for a lagoon

site or piping sewage to adjacent, more suitable areas. Local roads and streets need to be strengthened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action. Some cuts and fills may be necessary because of slope.

The capability subclass is VIe, and the woodland ordination symbol is 3o.

24A—Midco cherty loam, 1 to 3 percent slopes. This nearly level, somewhat excessively drained soil is on first bottoms along streams. It is subject to occasional flooding. Areas are linear with the long axis parallel to the stream. They range from 10 to 200 acres.

Typically, the surface layer is dark grayish brown cherty loam about 9 inches thick. The substratum extends to a depth of 60 inches or more. It is brown and strong brown very cherty loam and very cherty sandy loam. In places the surface layer is silt loam.

Included with this soil in mapping are small areas of well drained Elk, Nolin, and Secesh soils. They are on slightly higher positions and make up about 5 to 10 percent of the unit.

Permeability of the Midco soil is moderately rapid, and surface runoff is slow. The available water capacity is low. Reaction of the subsoil ranges from strongly acid to slightly acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is low. A cherty surface layer inhibits tillage operations.

More than half of the acreage of this soil is used for pasture or hay. A large acreage is in timber. Several areas are used for cultivated crops or wheat. This soil is suited to grasses and legumes for hay and pasture. It is also suitable for orchards. It is poorly suited to cultivated crops because of flooding and droughtiness. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. If the soil is used for cultivated crops, the regular addition of organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees. There are no major hazards or management problems for planting or harvesting trees. Seedling mortality is a hazard because of droughtiness. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival.

This soil generally is unsuitable for building site development or sanitary facilities because of occasional flooding.

The capability subclass is IIIs, and the woodland ordination symbol is 4f.

25—Nolin silt loam. This nearly level, well drained soil is on flood plains adjacent to the major stream channels. It is subject to occasional flooding. Areas are elongated and irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of 60 inches is brown, friable silt loam. It is mottled in the lower part.

Included with this soil in mapping and making up about 5 to 10 percent of the unit are small areas of somewhat excessively drained Midco soils.

Permeability of the Nolin soil is moderate, and surface runoff is slow. The available water capacity is high. Reaction of the subsoil ranges from medium acid to mildly alkaline. Reaction in the surface layer varies widely as a result of local liming practices. The organic matter content is moderate, and natural fertility is medium. This soil is easy to keep in good tilth, and it can be tilled throughout a wide range of moisture content.

Most areas of this soil are used for pasture or hay. Several areas are used for timber, cultivated crops, or wheat. This soil is suited to grain sorghum, soybeans, wheat, vegetables, and grasses and legumes for hay and pasture. If this soil is used for cultivated crops, flooding is a hazard. The risk from flood damage can be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Returning crop residue or the regular addition of organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, occasional flooding is a hazard. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suited to trees, and a few small areas remain in timber. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, prescribed burning, and spraying, cutting, or girdling. There are no other limitations for planting and harvesting timber on this soil.

This soil generally is unsuitable for sanitary facilities and building site development because of occasional flooding.

The capability class is IIw, and the woodland ordination symbol is 1o.

26B—Peridge silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex foot slopes

in the upland. Areas are irregular in shape and range from 5 to about 20 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown, firm silty clay loam, and the lower part is yellowish red, firm silty clay loam.

Included with this soil in mapping are small areas of moderately well drained Captina soils, somewhat excessively drained Clarksville soils, and well drained Doniphan soils. The Doniphan and Clarksville soils have cherty surface layers. All of the soils are in narrow bands adjacent to the outer edge of the unit and make up 5 to 10 percent of the unit. Small eroded areas are also included in mapping.

Permeability of the Peridge soil is moderate, and surface runoff from cultivated areas is medium. The available water capacity is high. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is moderate. The surface layer is friable and easily tilled through a fairly wide range in moisture content, but it has a tendency to crust or puddle after hard rains.

Most areas of this soil are used for pasture. Several areas are used for cultivated crops, wheat, or timber. This soil is suited to corn, soybeans, small grain, vegetables, and grasses and legumes for hay and pasture. It is also suitable for orchards. If the soil is used for cultivated crops, erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and for onsite waste disposal if proper design and installation procedures are used. Slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field. The bottom and berms of sewage lagoons can be sealed with slowly permeable material to prevent seepage. Local roads and streets need to be strengthened by adding suitable base material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action.

The capability subclass is IIe, and the woodland ordination symbol is 3o.

26C—Peridge silt loam, 5 to 9 percent slopes. This moderately sloping, well drained soil is on convex foot slopes in the upland. Areas are irregular in shape and range from 5 to 20 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The upper part of the subsoil is strong brown and yellowish red, firm silty clay loam, and the lower part to a depth of 60 inches or more is red, firm silty clay loam. In some places the subsoil is cherty silty clay loam.

Included with this soil in mapping are small areas of moderately well drained Captina soils, somewhat excessively drained Clarksville soils, and well drained Doniphan soils. The Doniphan and Clarksville soils have cherty surface layers. All of these soils are in narrow bands adjacent to the outer edge of the unit and make up about 5 to 10 percent of the unit.

Permeability of the Peridge soil is moderate, and surface runoff from cultivated areas is medium. The available water capacity is high. Reaction of the subsoil ranges from strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is moderate. The surface layer is friable and easily tilled through a fairly wide range in moisture content, but it tends to crust or puddle after hard rains.

Most areas of this soil are used for pasture or hay. Several areas are used for cultivated crops, wheat, or timber. This soil is suited to corn, soybeans, small grain, vegetables, and grasses and legumes for hay and pasture. It is also suitable for orchards. If the soil is used for cultivated crops, erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Deep-rooted grasses and legumes grow well on this soil.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and for onsite waste disposal if proper design and installation

procedures are used. Slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field. Sites can be leveled for sewage lagoons and the bottom and berms of the sewage lagoons sealed with slowly permeable material to prevent seepage. Local roads and streets need to be strengthened by adding suitable material. Grading the roads to shed water and constructing adequate side ditches and culverts help to prevent damage caused by frost action.

The capability subclass is IIIe, and the woodland ordination symbol is 3o.

26C2—Peridge silt loam, 5 to 9 percent slopes, eroded. This moderately sloping, well drained soil is on convex foot slopes in the upland. Areas are irregular in shape and range from 5 to 20 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The upper part of the subsoil is yellowish red, firm silty clay loam, and the lower part to a depth of 60 inches or more is yellowish red, firm very cherty silty clay loam. In places numerous small gullies and erosion scars expose the yellowish red subsoil.

Included with this soil in mapping are small areas of moderately well drained Captina soils, somewhat excessively drained Clarksville soils, and well drained Doniphan soils. The Doniphan and Clarkville soils have cherty surface layers. All of these soils are in narrow bands adjacent to the outer edge of the unit and make up about 5 to 10 percent of the unit.

Permeability of the Peridge soil is moderate, and surface runoff from cultivated areas is medium. The available water capacity is high. Reaction of the subsoil ranges from strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is moderate. The surface layer is friable and easily tilled through a fairly wide range in moisture content, but it tends to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are used for pasture or hay. Several areas are used for cultivated crops, wheat, or timber. This soil is suited to corn, soybeans, small grain, vegetables, and grasses and legumes for hay and pasture. It is also suitable for orchards. If the soil is used for cultivated crops, further erosion is a hazard. Minimum tillage, winter cover crops, and grassed waterways help to prevent excessive soil loss. In a few areas slopes are long enough and smooth enough to be terraced and farmed on the contour. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Deep-rooted plants grow well on this soil.

This soil is suited to trees, and a few small areas remain in native hardwoods. There are no hazards or limitations for planting or harvesting trees.

This soil is suitable for building site development and for onsite waste disposal if proper design and installation procedures are used. Slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field. Sites can be leveled for sewage lagoons and the bottom and berms of the sewage lagoons can be sealed with slowly permeable material to prevent seepage. Local roads and streets need to be strengthened by adding suitable base material.

The capability subclass is IVe, and the woodland ordination symbol is 3o.

27—Secesh silt loam. This nearly level, well drained soil is on first bottoms adjacent to the stream channel. It is subject to occasional flooding. Areas are linear and range from 5 to 100 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The brown, strong brown, and yellowish brown subsoil extends to a depth of 60 inches or more. The upper part is very friable silt loam and silty clay loam, and the lower part is friable very cherty clay loam. It is mottled in the lower part.

Included with this soil in mapping are small, intermingled areas of Elk and Midco soils. The Midco soil is cherty throughout, and the Elk soil does not have chert in the lower part of the subsoil. These soils make up about 5 to 15 percent of the unit.

Permeability of the Secesh soil is moderate, and surface runoff is slow. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to neutral. Reaction in the surface layer varies widely as a result of local liming practices. The organic matter content is low, and natural fertility is medium. The surface layer is very friable and is easily tilled through a fairly wide range in moisture content.

Most areas of this soil are used for pasture or hay. Several areas are used for cultivated crops, wheat, or timber. This soil is suited to grain sorghum, soybeans, wheat, vegetables, and grasses and legumes for hay and pasture. If the soil is used for cultivated crops, flooding is a hazard. The risk of flood damage can be reduced by planting late in spring and harvesting early in fall. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Returning crop residue or the regular addition of organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If this soil is used for pasture, occasional flooding is a hazard. Overgrazing or grazing when the soil is wet

causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and soil in good condition. Native grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees, and a few small areas remain in timber. There are no limitations for planting and harvesting timber on this soil.

This soil generally is unsuitable for sanitary facilities and building site development because of occasional flooding.

The capability subclass is IIw, and the woodland ordination symbol is 4o.

28—Tuckerman fine sandy loam. This nearly level, poorly drained soil is in drainages, basins, and on other parts of low terraces. It is subject to occasional flooding. Areas are linear and irregular in shape. They range from 5 to several hundred acres.

Typically, the surface layer is dark grayish brown, very friable fine sandy loam about 3 inches thick. The subsurface layer is grayish brown, mottled, very friable fine sandy loam about 10 inches thick. The subsoil is light brownish gray fine sandy loam and gray, mottled sandy clay loam about 36 inches thick. The upper part is friable, and the lower part is firm. The substratum to a depth of 60 inches or more is firm, gray fine sandy loam.

Included with this soil in mapping are small areas of clayey Kobel soils in shallow depressions or old drainageways and ponded areas of Tuckerman soils. Also included are intermingled areas of well drained Bosket soils on natural levees or terraces. The included soils make up about 5 to 15 percent of the unit.

Permeability of the Tuckerman soil is moderately slow, and surface runoff is very slow. Available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. The organic matter and natural fertility are low. This soil is easy to keep in good tilth and can be tilled throughout a wide range of moisture content. A seasonal high water table near the surface to within 1 foot of the surface limits root development.

Most areas of this soil are used for cultivated crops (fig. 18). Several areas are in wheat, pasture, and timber. This soil is suited to corn, soybeans, grain sorghum, rice, vegetables, and wheat. If the soil is used for cultivated crops, returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration. Land grading and surface ditches can be installed to dispose of excess water.

If this soil is used for pasture, occasional flooding is a hazard. In addition, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown.

This soil is suited to trees, and several small areas remain in timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods during which the soil is dry or frozen. Ridging the soil and planting on the ridges helps to increase seedling survival. Lighter, less intensive, more frequent thinnings to reduce the stand density may be necessary to minimize the damage from windthrow. Severe plant competition can be reduced by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting.

This soil generally is unsuited to sanitary facilities and building site development because of flooding.

The capability subclass is IIIw, and the woodland ordination symbol is 1w.

29B—Tuckerman-Bosket fine sandy loams, 0 to 5 percent slopes. This map unit consists of nearly level, poorly drained Tuckerman soil and gently sloping, well drained Bosket soil. It is typified by low, convex sand ridges and mounds of Bosket soil surrounded by lower lying Tuckerman soil. The Tuckerman soil is subject to occasional flooding. Areas range from 5 to 200 acres. Typically, the unit is 65 percent Tuckerman soil and 35 percent Bosket soil. The soils are mapped together because they are in such an intermingled pattern that it is not feasible to map them separately.

Typically, the Tuckerman soil has a surface layer of dark grayish brown fine sandy loam about 4 inches thick and a subsurface layer of grayish brown fine sandy loam about 8 inches thick. The subsoil is about 30 inches thick. It is light brownish gray, mottled, firm sandy clay loam. The substratum is firm, light brownish gray fine sandy loam.

Typically, the Bosket soil has a surface layer of dark brown fine sandy loam about 7 inches thick and a subsurface layer of brown fine sandy loam about 8 inches thick. The subsoil to a depth of about 65 inches is dark yellowish brown, firm sandy clay loam. In some areas the surface layer is lighter colored.

Included with these soils in mapping are small areas of clayey Kobel soils and ponded areas of Tuckerman soils. The included soils are in lower positions on the landscape and make up about 5 to 10 percent of the unit.

Permeability of the Tuckerman soil is moderately slow, and surface runoff is very slow. The available water capacity is moderate. Reaction of the subsoil ranges from very strongly acid to medium acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility and the organic matter content are low. This soil is easy to keep in good tilth and can be tilled throughout a wide range of moisture content. A

Figure 18. Furrow irrigation of soybeans on Tuckerman fine sandy loam.

seasonal high water table, near the surface to within 1 foot of the surface, limits root penetration and development.

Permeability of the Bosket soil is moderate, and surface runoff is slow. The available water capacity is moderate. Reaction of the subsoil ranges from slightly acid to very strongly acid. Reaction in the surface layer varies widely as a result of local liming practices. Natural fertility is medium, and the organic matter content is moderate. The surface layer is friable and easily tilled through a wide range in moisture content.

Most areas of these soils are farmed. Several acreages are used for wheat, pasture, and timber. These soils are suited to corn, soybeans, grain sorghum, rice, wheat, and vegetables (fig. 19). They are also suitable for orchards. If these soils are used for cultivated crops, wind erosion and water erosion are hazards on the Bosket soil. Minimum tillage and winter cover crops help to prevent excessive soil loss. Flooding is a hazard on the Tuckerman soil. Crops should be planted late in spring, and harvested early in fall to reduce the risk of damage from floods. Flooding is of short duration and generally occurs early enough in the season so that wheat is not damaged. Land grading and drainage ditches help to dispose of excess water. Returning crop residue or the regular addition of other organic material helps to improve fertility, reduce crusting, and increase water infiltration.

If these soils are used for pasture, overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown on the Tuckerman soil. Deep-rooted grasses and legumes grow well on the Bosket soil.

These soils are suited to trees, and a few small areas

remain in timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods during which the Tuckerman soil is dry or frozen. Ridging the soil and planting on the ridges helps to increase seedling survival. Windthrow and plant competition are management concerns on the Tuckerman soil. Plant competition is a concern on the Bosket soil. Lighter, less intensive, more frequent thinnings to reduce the stand density may be necessary to minimize the damage from windthrow. Plant competition can be reduced by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting.

The Tuckerman soil generally is unsuited to building site development, sanitary facilities, and local roads and streets because of occasional flooding. The Bosket soil has no limitations for building site development or for septic tank absorption fields. Grading the roads and streets to shed water helps to prevent damage caused by frost action.

The capability subclass is IIIw. The Tuckerman soil is assigned to woodland ordination symbol 1w and the Bosket soil to woodland ordination symbol 2o.

30—Wideman fine sandy loam, 0 to 5 percent slopes. This nearly level and gently sloping, excessively drained soil is on first bottoms and natural levees. It is subject to occasional flooding. Areas are circular and linear and range from 5 to about 200 acres.

Typically, the surface layer is dark brown fine sandy loam about 9 inches thick. The upper part of the substratum is dark yellowish brown fine sandy loam and loamy sand, and the lower part to a depth of 60 inches or more is yellowish brown loamy fine sand.

Included with this soil in mapping are small areas of well drained Elk and Nolin soils. These soils are on high

Figure 19. The baled wheat straw in the foreground is on Bosket fine sandy loam. The ricefield in the background is on Tuckerman fine sandy loam.

positions and low positions adjacent to the boundaries of the unit. They make up about 5 to 15 percent of the unit.

Permeability of the Wideman soil is moderately rapid, and surface runoff is slow. The available water capacity is moderate. Reaction throughout the profile ranges from slightly acid to medium acid. Natural fertility and the organic matter content are low. The surface layer is friable and easily tilled through a wide range in moisture content.

Most areas of this soil are used for pasture or hay. Some areas are used for wheat, and a few small areas are in timber or brush. This soil is suited to pasture and to limited production of wheat. It is also suitable for orchards. It is generally unsuitable for cultivated crops because of occasional flooding and droughtiness.

If this soil is used for pasture, overgrazing reduces the stands and increases weed growth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees, but seedling mortality is a concern. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival.

This soil generally is unsuited to sanitary facilities and small building site development because of occasional flooding and seepage.

The capability subclass is IIIs, and the woodland ordination symbol is 3s.

31B—Wilderness cherty silt loam, 2 to 7 percent slopes. This gently sloping to moderately sloping, moderately well drained soil is on narrow to broad ridgetops. Areas are linear and irregular in shape. They range from 5 to 100 acres.

Typically, the surface layer is very dark grayish brown cherty silt loam about 4 inches thick. The subsurface layer is pale brown very cherty silt loam about 4 inches thick. The upper part of the subsoil is yellowish brown very cherty silt loam and strong brown very cherty silty clay loam; the middle part is a fragipan of light yellowish brown, mottled, brittle and firm very cherty clay loam; the lower part to a depth of 60 inches or more is strong brown, mottled, firm very cherty clay. A few intermingled areas have stones on the surface.

Included with this soil in mapping are from 5 to 15 percent Captina, Clarksville, and Doniphan soils. The somewhat excessively drained Clarksville soils and the well drained Doniphan soils are on crests of ridges, ridge points, and steep side slopes. The Captina soils do not have chert in the upper part and are in intermingled, concave positions on broad ridgetops.

Permeability of the Wilderness soil is moderate above the fragipan and slow in the fragipan. Available water capacity is low. Reaction of the subsoil ranges from slightly acid to very strongly acid. Reaction in the surface layer varies widely as a result of local liming practices. The organic matter content and natural fertility are low. This soil is easy to keep in good tilth. The water capacity is limited because the high chert content and fragipan cause the soil to be droughty. The fragipan also restricts root penetration of deeply rooted plants. A perched water table is above the fragipan during wet periods.

Most areas of this soil are in timber. Several areas are used for pasture or hay. This soil is suited to grasses and legumes for pasture; however, restricted rooting depth and droughtiness are limitations. Overgrazing or grazing when the soil is wet causes surface compaction and reduces the stand of grasses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition. Native warm-season grasses sustain their growth on this soil during the hot summer months when shortages of rainfall are common.

This soil is suited to trees, and most areas remain in native timber. Seedling mortality and windthrow are management concerns. Planting special stock of larger size than usual or planting container-grown stock may be necessary to achieve better survival of seedlings. Lighter, less intensive, more frequent thinnings to reduce the stand density may be needed to minimize the damage from windthrow.

This soil is suited to sanitary facilities and building site development. Excessive wetness caused by the perched water table can be corrected by using tile drains around building foundations and footings. Sewage lagoons function properly if the bottom and berms are sealed with slowly permeable material. Wetness and frost action are limitations for local roads and streets. These limitations can be overcome by grading the roads to shed water and constructing drainage ditches with deep sides and culverts.

The capability subclass is IVs, and the woodland ordination symbol is 4d.

32—Pits. This map unit consists of open excavations from which soil material has been removed and gravel, sand, or bedrock is exposed. Most of the areas are gravel pits. One large area on the Black River near Hendrickson is made up of sand, gravel, and limestone pits. Another large area on the Black River near Hillard is a sand pit.

The typical quarry has a vertical face or exposure of the rock formation that is being mined. These exposures range from 20 to 40 feet high. Above the vertical face is an overburden of soil material ranging from 15 to 25 feet thick in most places. This overburden is removed and stockpiled on adjoining undisturbed areas or is placed in previously mined pits.

Pits are not suitable for use as cropland or pasture.

They do not have enough soil material, or they are too steep. Weeds or brush grows on the stockpiled soil material. Some of the abandoned deep pits have no outlets for drainage and fill with water. With proper reclamation, however, most of these quarries have potential for use as wildlife habitat or for recreation.

This map unit is not assigned to a capability subclass or woodland ordination symbol.

33—Calhoun silt loam. This nearly level, poorly drained soil is on broad terraces. Areas are elongated, and some are irregular in shape. They range from 6 to several hundred acres.

Typically, the surface layer is grayish brown, very friable silt loam about 6 inches thick. The subsurface layer is light gray, very friable silt loam about 10 inches thick. The subsoil to a depth of 60 inches or more is light gray and light brownish gray silt loam and silty clay loam.

Included with this soil in mapping and making up 5 to 15 percent of the unit are intermingled areas of Lafe, Foley, or Dubbs soils and some ponded areas of Calhoun soils. Small areas of borrow pits and spoil along the St. Francis River are also included. The Lafe and Foley soils are high in content of sodium and are at slightly higher elevations. The well drained Dubbs soils are on small mounds or ridges.

Permeability of the Calhoun soil is slow, and surface runoff is slow or very slow. The available water capacity is high. The surface layer is very strongly acid or strongly acid unless limed. Natural fertility is medium, and the organic matter content is low. The friable surface layer is in good tilth and is easily worked, but it tends to crust and puddle if worked when wet or after hard rains. A perched water table is near the surface or is within 2 feet of the surface during wet periods. Shrink-swell potential is moderate.

Most areas of this soil are cultivated. This soil is suited to soybeans, wheat, grain sorghum, cotton, rice, irrigated corn, and selected grasses and legumes for pasture and hay. Excess surface water can generally be removed by a system of field and lateral ditches except where potholes occur. Land grading helps to eliminate potholes, improves surface drainage, and provides a suitable grade for irrigation. Residue management that leaves a protective surface cover helps to reduce surface crusting and improve fertility and water intake.

Areas that are used for pasture or hay generally are small. This soil is easily compacted if grazed or worked when wet. Grazing when the soil is wet also causes poor tilth and a reduced stand of grasses. Proper stocking rates, timely deferment of grazing, and deferment of hay cutting during wet periods help to keep the pasture and soil in good condition. Plants that tolerate wetness should be grown.

This soil is suitable for trees, and a few small areas remain in native timber. Restricted use of equipment is a limitation during wet periods. Equipment operations should be timed for periods during which the soil is dry or frozen. Once seedlings are established, they grow well; however, moderate seedling mortality is a concern. Ridging the soil and planting on the ridges helps to increase seedling survival. Lighter, less intensive, more frequent thinnings to reduce stand density may be necessary to minimize the damage from windthrow. Plant competition for seedlings can be reduced by thorough site preparation. Such preparation may include prescribed burning, spraying, or cutting.

This soil has limitations for building site development and sanitary facilities because of wetness. Foundations, basement walls, and footings require treatment, such as sealing the wall and using foundation and footing drains. The bottom and berms of lagoons should be sealed with slowly permeable material. Road bases can be strengthened by adding suitable material to prevent damage caused by low strength. Roadbeds can be constructed on raised, well compacted material, or the water table can be lowered by constructing adequate side ditches and culverts.

The capability subclass is IIIw, and the woodland ordination symbol is 3w.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops if they are treated and managed using acceptable farming methods. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are

permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 5 percent. More detailed information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service or the Missouri University Extension Service.

About 370,800 acres, or nearly 46 percent of the survey area, is prime farmland. The areas are scattered but are mostly in the southeastern half of the survey area. They are mainly in soil associations 6, 7, and 8 of the general soil map. Approximately 318,850 acres of this prime farmland is used for crops. Crops grown on this land, mainly soybeans, grain sorghum, wheat, rice, and irrigated corn, account for an estimated 70 percent of the agricultural income for the survey area each year (*15*).

A recent trend in land use in many parts of the survey area has been the conversion of prime farmland to urban and suburban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, or difficult to cultivate, and less productive than prime farmland.

Soil map units that make up prime farmland in Butler County and the part of Ripley County included in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units".

Soils that have a limitation, for example, a high water table, qualify as prime farmland if the limitation is overcome. In table 5, the measures used to overcome this limitation are shown in parentheses after the map unit name. Onsite evaluation is necessary to see if the limitation has been overcome by corrective measures.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Approximately one-half of the survey area is cleared, and about 279,000 acres is used as cropland (*15*). Row crops and small grain are regularly grown on 40 percent of the soils (*8*). Soybeans, grain sorghum, wheat, rice, and irrigated corn are the major crops. Cotton, sunflowers, watermelons, cantaloups, orchard crops, and vegetable and other horticultural crops are grown on a few acres. Hay is grown on nearly 25,500 acres, and about 113,990 acres (*8*) is used for pasture.

The potential of the soils of the survey area for increased production of food and fiber is good. About 370,800 acres on nearly level to gentle slopes meets the soil requirements for prime farmland. An additional 94,000 acres of sloping soils is favorable for crop production if erosion is adequately controlled. Food and fiber production can also be increased considerably by extending the latest crop production technology to all cropland in the survey area. This survey can greatly facilitate the use of such technology.

Urban or built-up areas are increasing, but at present land used for crops is not being claimed for urban uses. The use of this soil survey to help make land use decisions that influence farming and urban uses is discussed in the section "Prime farmland."

Soil drainage is the major management concern in about 75 percent of the cropland of the survey area. These soils are naturally wet because of their position on the landscape. Some soils have slow permeability. Other soils are limited by both soil drainage and slow permeability. Calhoun, Amagon, and Tuckerman soils are poorly drained and are wet for long periods. The poorly drained, clayey Kobel and Houlka soils are also wet for long periods. In addition, areas of the somewhat poorly drained Foley, Crowley, and Hartville soils and the moderately well drained Lafe, Hontas, and Adler soils receive water from adjacent slopes. Excessive water can be removed from most of the soils by constructing a system of field ditches or by land grading. Land grading eliminates potholes and provides a suitable grade for supplemental irrigation water. Diverting the runoff from upland soils can benefit some areas of the Adler and

Hartville soils. In addition to these limitations, many of the soils are subject to flooding. Flooding commonly occurs early in spring and in most years does not damage growing crops.

Soil erosion is the major management concern on about 25 percent of the cropland. If the soil has slopes of more than 2 percent, it is subject to erosion. Most eroded areas are in the Captina, Dubbs, Loring, and Peridge soils. Spots of one to five acres in these areas are severely eroded in draws and on side slopes. Sheet and rill erosion are dominant, but some old gullies persist. Loss of the surface layer is especially damaging in the Captina and Loring soils. These soils are limited in available water capacity and rooting depth because of a fragipan. The eroded material enters lakes, ponds, and streams. Control of erosion is needed to minimize stream pollution by sediment and improve the water quality for domestic, municipal, recreation, and wildlife uses. Crop rotation, permanent vegetative cover, conservation tillage, contouring, use of terrace systems, diversions, and grade stabilization structures can help to control erosion.

Crop rotation reduces the time that the soil is planted in erosive cultivated crops by alternating these crops with close grown protective vegetation. A permanent vegetative cover, such as grasses and legumes grown for hay or pasture, can reduce soil loss to a negligible amount. Conservation tillage, which minimizes plowing and cultivation and leaves crop residue on or near the surface, helps to increase infiltration and reduce runoff and erosion. Minimum tillage helps to maintain good tilth, increase infiltration, and reduce erosion. Corn leaves substantially more residue on the soil than a comparable yield of soybeans or grain sorghum. Plowing in spring rather than in fall permits residue to remain on the surface throughout the winter and thereby helps to reduce erosion. Tillage that leaves large amounts of residue on the surface during the growing season is also effective. Special techniques, such as use of chisel plows and direct planting of conventionally plowed fields, reduce the amount of actual tillage. At present no-till planting is gaining acceptance. Contouring and contour stripcropping are erosion control practices that can be used in the survey area. These methods of controlling erosion are best adapted to soils that have smooth, uniform slopes, for example, Bosket and Dubbs soils and some areas of Captina, Loring, and Peridge soils. Terraces and diversions reduce the length of slope and minimize runoff and erosion. These devices are most practical on deep, well drained or moderately well drained soils that have uniform slopes. Some areas of Bosket, Dubbs, Captina, Loring, and Peridge soils are suitable for terraces.

Fertilizer is needed on all soils if high yields are to be maintained. Natural fertility is moderate for Adler, Bosket, Calhoun, Captina, Dubbs, Elk, Foley, Gasconade, Hartville, Hontas, Houlka, Kobel, Lafe, Loring, Midco, Nolin, Peridge, and Secesh soils. These soils commonly require heavy applications of phosphate and moderate amounts of lime, nitrogen, and potash. Soils that are low in fertility, such as Amagon, Bardley, Clarksville, Crowley, Doniphan, Tuckerman, and Wideman soils, require heavy applications of most of the elements essential for plant growth.

Soil tilth is an important factor in seedbed preparation, germination of seeds, and the infiltration of water into the soil. Soils that have good tilth are granular and porous. Organic matter content is important in maintaining good tilth. Most soils used for crops in the survey area have a surface layer of silt loam that is low in organic matter content. Generally, the soil structure of frequently cultivated fields is weak and intense rainfall causes the soil particles which form the surface layer to run together and crust. This crust hardens when dry, which reduces infiltration and increases runoff. Returning crop residue to the soil helps to maintain the organic matter content. It also reduces crusting and keeps the soil porous, thereby increasing the infiltration rate and the available water capacity.

Soil blowing is a hazard in areas of Bosket and Wideman soils. Most of the tillage and crop residue management practices that are effective for controlling water erosion are also effective in controlling soil blowing.

Field crops that are suited to local soils and climate include many crops that are not now commonly grown. Soybeans are by far the major row crop, and wheat continues to be the dominant small grain. Oats, barley, rye, alfalfa, red clover, timothy, orchardgrass, and many other crops can also be grown.

Small grains grow well on most tillable soils of the survey area where fertility is adequate. These crops grow during the cool months when moisture commonly is adequate. Deep, well drained soils that have moderate lime content, such as Bosket, Dubbs, Elk, Nolin, and Peridge soils, are best suited to alfalfa. Alluvial soils, such as Secesh and Midco soils, are also suited. Soils that have a fragipan, limited depth to bedrock, or wetness are better suited to clover. If adequately fertilized and drained, most of the soils suited to pasture and hay can support red clover, Ladino, and other clovers. Fescue, orchardgrass, and other cool-season grasses grow well on most of the soils in the survey area. These grasses grow best in spring, early in summer, and in fall. Warm-season grasses can be used where there is need for additional midsummer pasture or hay.

Native warm-season grasses grow well in the survey area. Big bluestem, switchgrass, and indiangrass are tall grasses that once grew on small, isolated prairies within the survey area. Deep, well drained and moderately well drained soils, such as Adler, Bosket, Dubbs, Elk, Hontas, Nolin, and Peridge soils, are suited to all of these grasses. Hartville and Doniphan soils, which have a firm,

clayey subsoil, are probably best suited to big bluestem. Soils that have restricted rooting depth or other properties that limit the available water capacity, such as Captina, Gatewood, Bardley, Loring, Midco, and Wideman soils, are best suited to switchgrass and indiangrass.

Special crops grown in the survey area are strawberries, apples, peaches, vegetables, sunflowers, watermelons, cantaloups, nursery crops, and other horticultural crops. The acreage used for these crops could be increased and special crops, such as grapes, blueberries, other fruits, vegetables, nuts, and nursery plants, can also be grown.

Many vegetables, small fruits, and tree fruits grow best on deep soils that have natural drainage and that warm up early in spring. The soils in the survey area best suited to these crops are the nearly level or gently sloping Elk, Dubbs, Bosket, Nolin, and Peridge soils. They make up about 53,000 acres. Fruit trees can be grown on soils that have slopes of 5 to 9 percent, for example, Bosket and Peridge soils, which comprise about 6,600 acres. The gently sloping Doniphan and Clarksville soils, which make up about 67,000 acres, are well suited to vegetables and fruits if they are irrigated. Crops generally can be planted and harvested on these well drained soils earlier than on the other soils in the survey area.

Irrigation is practiced on the soils that formed on former flood plains of the Mississippi. Most irrigation is of the contour, border, or furrow type. A few sprinkler systems are used in areas that have rolling topography. The main irrigated crops are corn and rice. Some areas of soybeans and grain sorghum are also irrigated.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (*12*). Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use. There are no class V soils in the survey area.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. There are no class VIII soils in the survey area.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, or s* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

In class I there are no subclasses because the soils of this class have few limitations.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

James L. Robinson, forester, Soil Conservation Service, and Craig R. Homesley, assistant resource forester, Missouri Department of Conservation, assisted in the preparation of this section.

According to a 1972 survey, about 437,800 acres of Butler and Ripley Counties is in commercial forest (*13*). Of this acreage, about 94,330 acres of the Mark Twain National Forest in Ripley County is not included in this survey area. The majority of the timber in these counties is in the uplands. Oak-hickory and oak-pine are the primary forest cover types in this area. The Doniphan-Clarksville, Clarksville-Captina, Doniphan-Captina, and Loring-Captina-Clarksville soil associations are in this area. White oak, black oak, southern red oak, blackjack oak, post oak, and scarlet oak (fig. 20) are the major forest species. Mockernut, bitternut, and pignut hickories together with shortleaf pine are also common.

Aspect is an important factor in tree growth. South-facing slopes tend to be droughty, and tree growth is slow. Wood quality generally is marginal in these areas. Sites have a predominance of post oak, black oak, scarlet oak, and hickories. Some pine trees are grown on these exposures. Shortleaf pine generally is considered the most desirable species grown on the southern exposures. North-facing slopes typically have more available moisture, better growth, and quality (fig. 21) than south-facing slopes.

Soils on bottom lands in these associations along the streams and tributaries produce northern red oak, Shumard oak, white oak, shagbark hickory, black cherry, black walnut, sycamore, elm, hackberry, river birch, and ash. Tree growth and quality tends to be good to excellent along these drainageways.

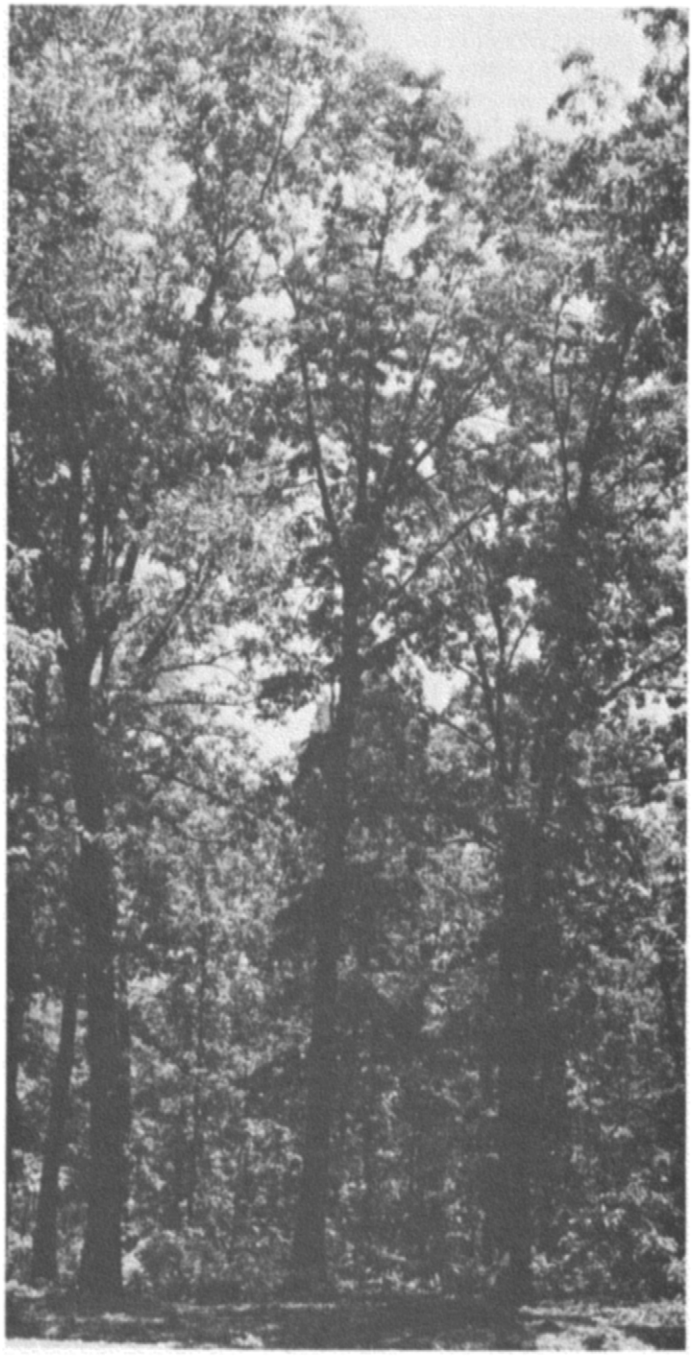


Figure 20. Young stand of hardwoods on Clarksville very cherty silt loam, 2 to 9 percent slopes.

The Loring-Captina-Clarksville soil association lies between the large areas of bottom land and the other associations on uplands. The forest cover is a transition between upland oaks and bottom land species. Sweetgum, cherrybark oak, shagbark hickory, maple, and river birch generally grow on the lower areas. The

deeper, well drained soils have good potential for yellow-poplar and black walnut.

Southern red oak, black oak, white oak, post oak, northern red oak, scarlet oak, and Shumard oak become more predominant in the higher areas away from drainageways. White ash and the hickories also grow in these areas. Past management, which included indiscriminate logging practices and frequent burning and grazing, reduced the wood quality and production in many parts of this area. Good forest management practices, however, can restore much of the production potential of the area and improve the wood quality.

The Calhoun-Amagon, Tuckerman-Bosket, and Calhoun-Crowley-Foley soil associations are in Mississippi Valley alluvium. Although most of this area is used for cropland, tree productivity is very high. Different species of trees grow on the different sites because of varying ground water levels and inundation periods. Baldcypress, water tupelo, and overcup oak grow in the lowest slough areas. Pine, cherrybark, willow, swamp chestnut, and water oak grow on other areas of these soils, depending on the moisture regime of the site. Sweetgum, river birch, hackberry, elm, maple, honeylocust, sycamore, and hickory are also common trees growing in this area.

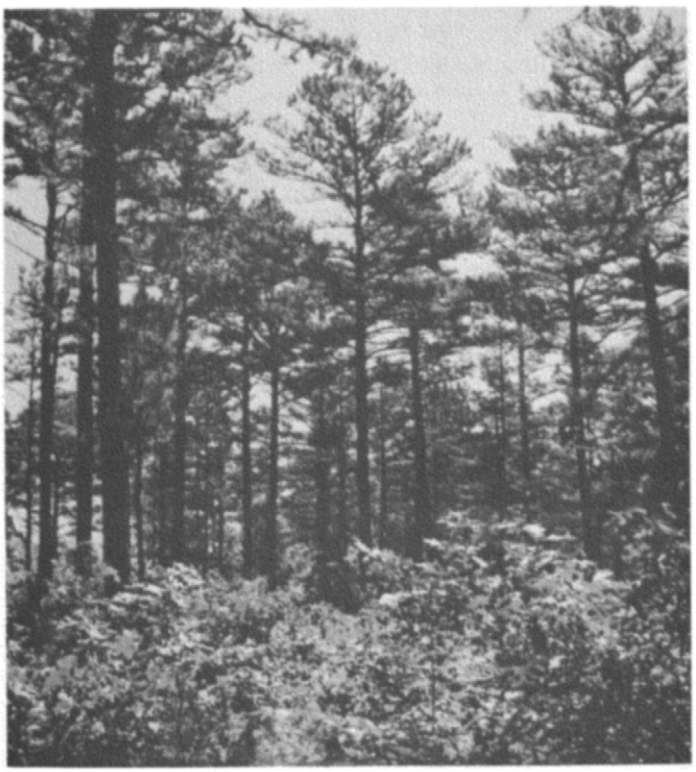


Figure 21. Young stand of pine of Captina silt loam, 2 to 5 percent slopes.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant

competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

windbreaks and environmental plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

recreation

Edward A. Gaskins, biologist, Soil Conservation Service, assisted in the preparation of this section.

According to the facility inventory part of the 1980 Statewide Comprehensive Outdoor Recreation Plan (SCORP), 50,663 acres is in recreational developments in Butler County and 97,899 acres is in Ripley County. These areas make up 148,562 acres of the survey area (*10*). Ownership of these acres is about 96 percent federal, 3 percent state, and 1 percent private, municipal, school, and other owners. Facilities include water sports areas, swimming pools, golf courses, hunting and fishing areas, campgrounds, ballfields, playgrounds, game courts, picnic areas, trails, horse stables, and wildlife viewing areas.

The Mark Twain National Forest, comprising 133,020 acres, is by far the largest supplier of recreational needs in the survey area. State owned forests make up more than 8,000 acres of public recreation areas. In addition, 3,000 acres is provided by the state wildlife areas, river access areas, and tower sites. The Asher Creek tributary of Lake Wappapello is along the northern border of Butler County.

According to the 1974 NACD Nationwide Outdoor Recreation Inventory, 32 private and semiprivate commercial recreation enterprises are in the survey area (*3*). They vary from fishing lakes, resorts, boat rentals, and church camps to country clubs, drive-ins, racetracks, and campgrounds. Additional needed facilities cited in the inventory include more hunting areas for Butler County and more water sports and fishing areas for Ripley County.

SCORP projections on population growth indicate a 16.3 percent increase in Bulter County from 1970 to 1990 and a 53.2 percent population increase in Ripley County during this period (*6*). The large acreage of federally owned land throughout this area should adequately provide for the outdoor recreation needs of this increased population. In the Ozarks region, private enterprise has provided many recreation facilities that are not provided by the various public agencies.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be

offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

Edward A. Gaskins, biologist, Soil Conservation Service, assisted in the preparation of this section.

Butler County is one of 7 counties that make up the Mississippi Lowland Zoogeographic Region, and Ripley County is one of 24 counties that make up the Ozark Plateau Zoogeographic Region (*9*). The topography of these regions consists of two broadly different types. In one region the land area is mostly rough, hilly, and stony with small, nearly level, and steep areas near the large streams. In the other region, which is part of the Mississippi lowlands area except for a few low ridges, the land area is relatively flat and has little or no relief (*6*). Both counties have shown increases in population between 1970 and 1980.

At present, approximately 317,000 acres of land in the survey area is classified as some form of woody vegetation. This vegetation includes smaller species, such as shrubs and other brushy plants. Of the remaining acreage about 38 percent is used for cropland and 19 percent for grassland. A 1972 report showed about 343,470 acres of commercial forest land in the survey area (*13*).

The Clarksville-Captina, Doniphan-Clarksville, Loring-Captina-Clarksville, and Doniphan-Captina soil associations are over 50 percent wooded vegetation. These associations provide most of the habitat for woodland wildlife species. This area has substantially decreased in woodland acreage over the last decade. The loss of bottom land timber is considered the most serious threat to wildlife in the area. Losses have also occurred in the uplands. The deer population is rated as good in Ripley County, but in Butler County, which is showing some habitat loss because of urban encroachment, the number of deer is rated only fair. In the bottom land region, only the Little Black River and Cane Creek drainageways provide adequate wooded habitat for deer. The number of turkeys are rated fair in Butler County, and they are presently expanding into new habitat. In Ripley County, the turkey population is rated excellent. The number of squirrels are rated good to excellent. There is also a small population of woodcock in both counties.

The furbearing population is rated very good to excellent for both counties. Trapping has increased in recent years in direct proportion to rising fur prices. In the 1978-79 trapping season raccoon, opossum, muskrat, mink, beaver, gray fox, and coyote were the most trapped species in both counties.

The Calhoun-Crowley-Foley, Tuckerman-Bosket, Calhoun-Amagon, and Captina-Loring-Clarksville soil associations provide the majority of openland wildlife habitat in Butler and Ripley Counties. The Calhoun-Crowley-Foley, Tuckerman-Bosket, and Calhoun-Amagon associations are in the Mississippi lowlands.

At present, Butler County is rated as fair in quail population, and Ripley County is rated good. The number of rabbits are considered to be fair. The population of mourning dove is small, but numbers increase each year when these birds visit the crop producing areas in migratory flights. Experimental stockings of Korean pheasant have been established in nearby counties, and if successful, this species could eventually be introduced

into the survey area. Conservation officials rate the habitat as good to excellent for all types of songbirds.

The Calhoun-Amagon, Tuckerman-Bosket, and Calhoun-Crowley-Foley soil associations are on the bottom lands of old Mississippi flood plains in both counties. In the 1800's, this region was part of a vast, swampy wilderness that covered the southeastern part of Missouri. These wetland areas were drained and converted to farm land. The Mississippi lowland water areas continue to attract large numbers of waterfowl, especially at those times the rivers are in flood stage. Some landowners flood their ricefields to attract the migratory ducks and geese for hunting. Large populations of wood ducks reside permanently along the areas adjacent to the St. Francis, Black, and Little Black Rivers, and along lower Cane Creek. However, because few if any permanent marshes remain today, wetland wildlife is far less plentiful than openland and woodland wildlife in the survey area.

Fishing opportunities are available among rivers, streams, drainage ditches, lakes, and farm ponds. There are 187 miles of permanent flowing streams in Butler County and 83 miles in Ripley County (*6*). The better areas for fishing in Butler County are the Black, St. Francis, and Little Black Rivers, Cane and Ten Mile Creeks, Main Ditch, Ditch No. 1, and Stillcamp Ditch, and the better areas in Ripley County are the Current and Little Black Rivers and Fourche, Beaver Dam, and Buffalo Creeks. These waters contain largemouth, smallmouth, and spotted bass, black and yellow bullhead, channel and flathead catfish, buffalo, drum, carp, suckers, and sunfish.

Impoundment fishing opportunities are somewhat limited in the survey area. Beaver Lake, the Asher Creek arm of Lake Wappapello, and the Fisk City Reservoir are the only large public lakes in Butler County. Lake Ripley is the only public water area in Ripley County.

Approximately 1,450 private farm ponds and small lakes in the survey area have been stocked with fish. Most of these have been stocked with largemouth bass, channel catfish, and bluegill.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, barley, millet, soybeans, and milo.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bluegrass, switchgrass, indiangrass, orchardgrass, clover, alfalfa, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, pokeweed, foxtail, croton, and partridgepear.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, wild plum, sumac, persimmon, and sassafras. Examples of fruit-

producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, crabapple, Amur honeysuckle, hawthorn, and hazelnut.

Coniferous plants furnish winter cover, browse, and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cutgrass, cattail, rushes, sedges, and buttonbush.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, red fox, woodchuck, and mourning doves.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 13 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath

the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the

water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

physical and chemical properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops.

They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*14*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Fluent (*Flu*, meaning river, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Udifluvents (*Udi*, meaning humid, plus *fluvent*, the suborder of the Entisols that are on flood plains).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Udifluvents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-silty, mixed, nonacid, thermic Aquic Udifluvents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*11*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*14*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Adler series

The Adler series consists of deep, moderately well drained, moderately permeable soils on bottom lands. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

The Adler soils are similar to Hontas soils and are adjacent to Calhoun, Elk, Midco, and Secesh soils. Hontas soils have more clay in the subsoil. Calhoun soils are poorly drained and are in lower positions than Adler soils. Elk soils are well drained and are on higher positions. Midco soils are somewhat excessively drained,

and Secesh soils are well drained. Both these soils are in lower positions than Adler soils.

Typical pedon in an area of Adler silt loam, 1,500 feet north and 200 feet west of the SE corner of sec. 34, T. 24 N., R. 5 E., in Butler County:

Ap—0 to 11 inches; mixed brown (10YR 5/3), pale brown (10YR 6/3), and light gray (10YR 7/2) silt loam, very pale brown (10YR 7/3) dry; weak medium platy structure; very friable; many fine roots; many small pores; few worm channels and casts; many fine concretions of iron and manganese oxides; neutral; abrupt smooth boundary.

C1—11 to 26 inches; pale brown (10YR 6/3) silt loam; common fine faint light gray (10YR 7/2) and dark brown (10YR 4/3) and common fine distinct brown (7.5YR 4/4) mottles; coarsely laminated; very friable; common fine roots along vertical faces; many small pores; few worm channels; many fine concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

C2—26 to 33 inches; pale brown (10YR 6/3) silt loam; many fine faint light gray (10YR 7/2) and common fine distinct dark brown (10YR 4/3) and brown (7.5YR 4/4) mottles; coarsely laminated; very friable; few fine roots; many small pores; few worm channels; many fine concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

C3—33 to 46 inches; light brownish gray (10YR 6/2) silt loam; many fine faint light gray (10YR 7/2) and common fine distinct dark brown (10YR 4/3) and prominent brown (7.5YR 4/4) mottles; coarsely laminated; very friable; few fine roots; many small pores; few worm channels; many fine concretions of iron and manganese oxides; medium acid; abrupt smooth boundary.

C4—46 to 60 inches; gray (10YR 6/1) silt loam; many fine faint light gray (10YR 7/2) and common fine prominent brown (7.5YR 4/4) mottles; coarsely laminated; very friable; common small pores; few worm channels; common fine concretions of iron and manganese oxides; medium acid.

The soil ranges from medium acid to mildly alkaline. The A horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or 3. The upper part of the C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The lower part of the C horizon also has value of 6 and chroma of 1 or 2.

Amagon series

The Amagon series consists of deep, poorly drained, slowly permeable soils on low terraces. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

The Amagon soils are similar to Calhoun soils and are adjacent to Calhoun, Kobel, and Tuckerman soils. Calhoun soils have tongues of the E horizon extending into the B horizon. Kobel soils have more clay throughout the solum and are on the lower positions than Amagon soils. Tuckerman soils have more sand throughout the solum and are on higher positions.

Typical pedon in an area of Amagon silt loam, 2,340 feet west and 250 feet south of the NE corner of sec. 26, T. 23 N., R. 7 E., in Butler County:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and very fine granular structure; friable; common fine roots; few small pores; a few worm channels and casts; common fine concretions of iron and manganese oxides; few fine faint brown (10YR 5/3) stains; strongly acid; abrupt smooth boundary.

Btg1—7 to 15 inches; light brownish gray (10YR 6/2) silty clay loam; common fine faint grayish brown (10YR 5/2) and many fine distinct dark yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; weak very fine subangular blocky structure; very friable; few coarse roots; common small pores; a few worm channels and casts; thin patchy clay films in pores; common fine concretions of iron and manganese oxides and a few large concretions of manganese oxides; strongly acid; clear smooth boundary.

Btg2—15 to 24 inches; light gray (10YR 6/1) silty clay loam; common fine distinct dark yellowish brown, few fine distinct grayish brown (10YR 5/2) and brownish yellow (10YR 6/6) mottles; weak fine and very fine subangular blocky structure; very firm; few coarse roots; few worm channels; few thin, discontinuous clay films on faces of peds and in voids; common fine concretions of manganese oxides; strongly acid; abrupt wavy boundary.

Btg—24 to 39 inches; light gray (10YR 6/1) silty clay loam; gray (10YR 5/1) discontinuous coats on faces of peds; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine and very fine subangular blocky structure; very firm; few coarse roots; few small pores; few small worm channels; thin discontinuous clay films on faces of peds and in voids; many small and large concretions of iron and manganese oxides; few fine yellowish red (5YR 5/8) and common fine brown (7.5YR 4/4) concretionary stains; strongly acid; clear smooth boundary.

Btg4—39 to 57 inches; light brownish gray (2.5Y 6/2) silty clay loam; dark gray (10YR 4/1) ped exteriors; few fine distinct light gray (10YR 7/1) mottles; moderate fine and very fine subangular blocky structure; very firm; few coarse roots; few small pores; few worm channels; thick discontinuous clay films on faces of peds and in voids; many small and large concretions of iron and manganese oxides; few fine yellowish brown (10YR 5/6) concretionary stains; strongly acid; gradual smooth boundary.

Btg5—57 to 60 inches; light gray (10YR 6/1) silty clay loam; grayish brown (10YR 5/2) discontinuous coats on faces of peds; few fine distinct pale brown (10YR 6/3) mottles; moderate very fine subangular blocky structure; very firm; few coarse roots; many small pores; few worm channels; thick discontinuous clay films on faces of peds and in voids; many small concretions of manganese oxides; common fine strong brown (7.5YR 4/4) concretionary stains; strongly acid.

Solum thickness ranges from 56 to 70 inches or more.

The Ap horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2). The A horizon is very strongly acid or strongly acid unless limed. The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Reaction is medium acid through very strongly acid.

Bardley series

The Bardley series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in residuum weathered from cherty limestone or dolomite and shale. Slopes range from 9 to 14 percent.

Bardley soils are similar to Gatewood soils and are adjacent to Clarksville, Doniphan, and Gasconade soils. Gatewood soils are moderately well drained and have Bt horizons of redder hue than Bardley soils. Clarksville, Doniphan, and Gasconade soils are in positions on the landscape similar to those of Bardley soils. Clarksville soils are deep and are cherty in the upper part of the subsoil. Doniphan soils are deep. Gasconade soils are shallow to bedrock.

Typical pedon in an area of Bardley cherty silt loam, 9 to 14 percent slopes, 2,310 feet south and 30 feet west of the NE corner of sec. 8, T. 22 N., R. 1 W., in Ripley County:

A—0 to 4 inches; dark grayish brown (10YR 4/2) cherty silt loam, light brownish gray (10YR 6/2) dry; moderate very fine granular structure; very friable; many coarse roots; many fine continuous vesicular pores; many worm channels and casts; few fine black concretions of iron and manganese oxides; 35 percent chert fragments; slightly acid; abrupt smooth boundary.

E—4 to 8 inches; brown (10YR 5/3) very cherty silt loam, pale brown (10YR 6/3) dry; weak very fine granular structure; very friable; many medium roots; many fine continuous vesicular pores; many worm channels and casts; few fine black concretions of iron and manganese oxides; 65 percent chert fragments; medium acid; clear smooth boundary.

Bt1—8 to 15 inches; yellowish red (5YR 4/6) clay; strong very fine subangular blocky structure; very firm; many medium roots; many fine continuous vesicular pores; few worm channels and casts; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; common black concretions of iron and manganese oxides; 5 percent chert fragments; strongly acid; clear smooth boundary.

Bt2—15 to 23 inches; yellowish red (5YR 5/6) clay; strong very fine subangular blocky structure; very firm; common medium roots; many fine continuous vesicular pores; few worm channels and casts; common fine black concretions of iron and manganese oxides; medium acid; abrupt wavy boundary.

Bt3—23 to 27 inches; strong brown (7.5YR 5/4) clay; many fine distinct strong brown (7.5YR 4/6) mottles; strong very fine subangular blocky structure; very firm; few fine roots; many fine continuous vesicular pores; few worm channels and casts; thin continuous yellowish red (5YR 4/6) clay films on faces of peds; common fine concretions of iron and manganese oxides; medium acid.

R—27 inches; dolomite.

Depth to bedrock ranges from 20 to 40 inches. Reaction ranges from very strongly acid to moderately alkaline just above the bedrock.

The A horizon has hue of 10YR, value of 3 through 6, and chroma of 2 or 3. The chert content of the A and E horizons ranges from 15 to 70 percent by volume. The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. The Bt horizons just above the bedrock have hue of 7.5YR or redder. Chert content is less than 15 percent by volume.

Bosket series

The Bosket series consists of deep, well drained, moderately permeable soils on natural levees. These soils formed in stratified beds of loamy sediment. Slopes range from 2 to 10 percent.

Bosket soils are adjacent to Amagon, Calhoun, and Tuckerman soils. Amagon, Calhoun, and Tuckerman soils are poorly drained and are in lower positions than Bosket soils.

Typical pedon in an area of Bosket fine sandy loam, 2 to 5 percent slopes, 1,155 feet south and 50 feet west of the NE corner of sec. 18, T. 25 N., R. 8 E., in Butler County:

Ap—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak medium platy structure; very friable; many fine roots; many small pores; few worm channels and casts; common fine concretions of iron and manganese oxides; medium acid; abrupt smooth boundary.

A—6 to 16 inches; dark yellowish brown (10YR 3/4) fine sandy loam, light yellowish brown (10YR 6/4) dry; weak medium platy structure; very friable; common fine roots; many small pores; few worm channels; common fine concretions of iron and manganese oxides; common fine faint dark yellowish brown (10YR 4/4) stains; slightly acid; clear smooth boundary.

Bt—16 to 48 inches; brown (7.5YR 4/4) sandy clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; very fine and fine subangular blocky structure; firm; common fine roots; many small pores; few worm channels and casts; thin patchy clay films bridge sand grains; common fine concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

C—48 to 60 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common fine faint yellowish brown (10YR 5/6) mottles; massive; friable; many small pores; common fine concretions of iron and manganese oxides; medium acid.

Thickness of the solum ranges from 36 to 50 inches or more. Reaction ranges from strongly acid to slightly acid unless limed.

The Ap is dark brown (10YR 3/3 or 7.5YR 3/2). The A horizon ranges from 6 to 18 inches in thickness in uneroded areas. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is sandy clay loam, clay loam, or fine sandy loam.

Calhoun series

The Calhoun series consists of deep, poorly drained, slowly permeable soils on high and low terraces and flood plains of large streams and their tributaries. These soils formed in silty alluvium. Slopes range from 0 to 1 percent.

Calhoun soils are similar to Amagon soils and commonly are adjacent to Amagon, Dubbs, Elk, Foley, Lafe, and Tuckerman soils. Amagon soils have more sand in the lower part of the solum. Dubbs and Elk soils are well drained, have brown subsoils, and are at higher elevations than Calhoun soils. Foley and Lafe soils have sodium in the subsoil and are at higher elevations. Tuckerman soils have more sand throughout the solum and are at higher elevations.

Typical pedon in an area of Calhoun silt loam, 1,170 feet east and 95 feet north of the SW corner of sec. 17, T. 23 N., R. 6 E., in Butler County:

Ap—0 to 7 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; weak medium platy structure parting to moderate very fine granular; very friable; many fine roots; many small pores; light brownish gray (10YR 6/2) silt coats; few worm channels; many fine and large concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

Eg—7 to 16 inches; light gray (10YR 7/1) silt loam; weak medium platy structure; very friable; common fine roots; many small pores; light gray (10YR 7/2) silt coats and brownish yellow (10YR 6/6) stains; few worm channels; many fine and large concretions of iron and manganese oxides; very strongly acid; clear wavy boundary.

BE—16 to 25 inches; light brownish gray (10YR 6/2) silt loam (B2t); many pockets of light gray (10YR 7/1) silt loam (A2g); moderate very fine subangular blocky structure, pockets of silt loam have thin platy structure; very friable; few fine roots; common small pores; few worm channels; thin discontinuous light gray (10YR 7/2) clay films on faces of peds, thick clay films in voids; many fine and large concretions of iron and manganese oxides; common fine prominent brownish yellow (10YR 6/6) stains; very strongly acid; clear wavy boundary.

Btg1—25 to 32 inches; light gray (10YR 6/1) silty clay loam; moderate fine and very fine subangular blocky structure; firm; few fine roots; many small pores; few worm channels; thick discontinuous light gray (10YR 7/2) clay films on faces of peds and in voids; many fine and large concretions of iron and manganese oxides; common fine prominent brownish yellow (10YR 6/6) stains; very strongly acid; clear wavy boundary.

Btg2—32 to 44 inches; light gray (10YR 6/1) silty clay loam; moderate fine and very fine subangular blocky structure; firm; few fine roots; many small pores; few worm channels; light brownish gray (10YR 6/2) thick clay seams and thick discontinuous clay films on faces of peds and in voids; many fine and large conretions of iron and manganese oxides; common fine prominent brownish yellow (10YR 6/6) stains; very strongly acid; clear smooth boundary.

Btg3—44 to 54 inches; light gray (10YR 6/1) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; many small pores; few worm channels; light brownish gray (10YR 6/2) clay seams and thick, discontinuous clay films on faces of peds and in voids; many fine and large concretions of iron and manganese oxides; many fine faint light brownish gray (10YR 6/2) and common medium prominent brownish yellow (10YR 6/6) stains; medium acid; clear smooth boundary.

Btg4—54 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; moderate fine and very fine subangular blocky structure; firm; few fine roots; common small pores; few worm channels; thick, patchy light brownish gray (10YR 6/2) clay films on faces of peds and in voids; many small and large concretions of iron and manganese oxides; common fine distinct yellowish brown (10YR 5/4-5/6) stains; medium acid.

Thickness of the solum ranges from 55 to 80 inches. The Ap horizon has hue of 10YR, value of 4 through 6, and chroma of 2 or 3. The A and E horizons range from very strongly acid through slightly acid. They are slightly acid where limed. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y, value of 6, and chroma of 1 or 2. Reaction typically is very strongly acid or strongly acid in the upper part but ranges to neutral in the lower part.

Captina series

The Captina series consists of moderately well drained soils that have a very cherty fragipan at a moderate depth. Permeability is moderate above the fragipan and slow through the fragipan. These soils formed in thin loess and cherty residuum on uplands. Slopes range from 2 to 9 percent.

In Butler and Ripley Counties, these soils have more chert in the upper part of the fragipan than is definitive for the Captina series. This difference, however, does not significantly affect the use and behavior of the soils.

Captina soils are similar to Loring soils and are adjacent to Clarksville, Doniphan, Loring, and Wilderness soils. Clarksville, Doniphan, and Wilderness soils have cherty surface layers, and the Clarksville and Doniphan soils do not have fragipans. All three soils are on narrow ridgetops and steeper side slopes. Loring soils do not have chert in the fragipan. They have less clay in the lower part of the profile than Captina soils.

Typical pedon in an area of Captina silt loam, 2 to 5 percent slopes, 1,285 feet south and 1,725 feet east of the NW corner of sec. 12, T. 25 N., R. 4 E., in Butler County:

A—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; discontinuous very dark grayish brown (10YR 3/2) coats on faces of peds; weak medium platy structure; very friable; many coarse roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

E—4 to 8 inches; pale brown (10YR 6/3) silt loam; weak medium platy structure; very friable; many coarse roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

Bt1—8 to 14 inches; strong brown (7.5YR 5/6) silty clay loam; moderate very fine subangular blocky structure; firm; common coarse roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

Bt2—14 to 20 inches; strong brown (7.5YR 5/6) silty clay loam; strong brown (7.5YR 4/6) coats on faces of peds; moderate fine subangular blocky structure; firm; common medium roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

Bt3—20 to 24 inches; strong brown (7.5YR 5/6) silty clay loam; few fine faint strong brown (7.5YR 5/8), common fine faint brown (7.5YR 5/4), and few fine prominent light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; firm; common medium roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

Bt4—24 to 28 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) mottles; a few gray (10YR 6/1) clay seams; moderate fine subangular blocky structure; firm; few fine roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; many fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

2B1—28 to 45 inches; light yellowish brown (10YR 6/4) very cherty silty clay loam; common fine faint very pale brown (10YR 7/3) and yellowish brown (10YR 5/4) and common fine distinct light brownish gray (10YR 6/2) mottles; many gray (10YR 6/1) clay seams; weak fine subangular blocky structure; firm in place, brittle when broken out; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; 65 percent chert fragments; extremely acid; abrupt wavy boundary.

2Btx2—45 to 57 inches; pale brown (10YR 6/3) and yellowish brown (10YR 6/4) cherty silty clay loam; many fine distinct strong brown (7.5YR 5/6) and common medium prominent red (2.5YR 4/8) mottles; moderate fine subangular blocky structure; firm in place, brittle when broken out; many small pores; a few worm channels and casts; thick clay films on faces of peds and in voids; common fine concretions of iron and manganese oxides; 35 percent chert fragments; very strongly acid; abrupt wavy boundary.

3Bt5—57 to 60 inches; red (2.5YR 4/8) very cherty clay; dark red (2.5YR 3/6) coats on faces of peds; strong very fine subangular blocky structure; firm; many small pores; a few worm channels and casts; common fine concretions iron and manganese oxides; 60 percent chert fragments; very strongly acid.

Solum thickness is more than 60 inches. Depth to the fragipan ranges from 16 to 30 inches. The A horizon ranges from strongly acid to slightly acid. It is slightly acid if limed. The remainder of the solum ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Chert content of the surface layers ranges from 0 to 10 percent. The B1t horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. The 2Btx horizon has hue of 10YR, value of 5 or 6, and chroma of 4 or 6. Chert content of the upper part ranges from 0 to 75 percent. The lower part is from 35 to 75 percent chert. The 3Bt horizon has hue of 10YR through 2.5YR, value of 5, and chroma of 4 through 8.

Clarksville series

The Clarksville series consists of somewhat excessively drained soils on uplands. These soils have moderately rapid permeability. They formed in residuum weathered from cherty dolomite. Slopes range from 2 to 35 percent.

Clarksville soils are adjacent to Captina, Doniphan, Loring, and Wilderness soils. The gently sloping Captina, Loring, and Wilderness soils have fragipans and are on broad ridgetops, upper side slopes, and foot slopes. Doniphan soils have more clay and less chert in the upper part of the subsoil than Clarksville soils. They are on lower side slopes.

Typical pedon in an area of Clarksville very cherty silt loam, 14 to 35 percent slopes, 260 feet south and 570 feet west of the NE corner of sec. 18, T. 25 N., R. 6 E., in Butler County:

A—0 to 5 inches; brown (10YR 4/3) very cherty silt loam, pale brown (10YR 6/3) dry; moderate very fine granular structure; very friable; many coarse roots; many small pores; many worm channels and casts; common fine concretions of iron and manganese oxides; 60 percent chert fragments; very strongly acid; abrupt smooth boundary.

E—5 to 13 inches; pale brown (10YR 6/3) very cherty silt loam; moderate very fine granular structure; very friable; many coarse roots; many small pores; many worm channels and casts; common fine concretions of iron and manganese oxides; 55 percent chert fragments; very strongly acid; abrupt wavy boundary.

Bt1—13 to 25 inches; mixed strong brown (7.5YR 5/6) and light yellowish brown (10YR 6/4) very cherty silty clay loam; moderate very fine subangular blocky structure; friable; few coarse roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; 70 percent chert fragments; very strongly acid; abrupt wavy boundary.

Bt2—25 to 43 inches; mixed strong brown (7.5YR 5/6), yellowish red (5YR 4/6), and light yellowish brown (10YR 6/4) very cherty silty clay loam; moderate very fine subangular blocky structure; firm; few coarse roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; 70 percent chert fragments; very strongly acid; abrupt wavy boundary.

2Bt3—43 to 60 inches; red (2.5YR 5/6 and 2.5YR 4/6) very cherty clay; strong fine subangular blocky structure; very firm; few coarse roots; common small pores; a few worm channels; common fine concretions of iron and manganese oxides; very strongly acid.

Solum thickness ranges from about 60 inches to more than 100 inches. The solum is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A horizon is 20 to 80 percent chert. The E horizon has hue of 10YR, value of 4 through 6, and chroma of 2 or 3. The Bt horizon has hue of 7.5YR through 2.5YR, value of 4 or 5, and chroma of 4 or 6. It is very cherty silty clay loam, cherty silt loam, very cherty silt loam, or very cherty clay. Chert content ranges from 35 to 75 percent.

Crowley series

The Crowley series consists of deep, somewhat poorly drained, very slowly permeable soils on low natural levees. These soils formed in silty and clayey alluvium. Slopes range from 0 to 1 percent.

Crowley soils are adjacent to Calhoun, Dubbs, Foley, and Houlka soils. Calhoun, Dubbs, and Foley soils have less clay in the subsoil than Crowley soils and are at higher elevations. Houlka soils have more clay in the surface layers and are in lower positions.

Typical pedon of Crowley silt loam, 90 feet south and 95 feet east of the NW corner of sec. 24, T. 22 N., R. 7 E., in Butler County:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium platy structure parting to moderate very fine granular; very friable; many fine roots; many small pores; many fine concretions of iron and manganese oxides; medium acid; abrupt smooth boundary.

E—6 to 8 inches; gray (10YR 6/1) silt loam; common fine faint light gray (10YR 7/2) mottles; weak medium platy structure parting to moderate very fine granular; very friable; few fine roots; many small pores; many fine concretions of iron and manganese oxides; strongly acid; abrupt wavy boundary.

Bt1—8 to 30 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; strong very fine subangular blocky structure; firm; few fine roots; many small pores; few thin patchy light grayish brown (10YR 6/2) clay films on faces of peds; many fine concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt2—30 to 45 inches; gray (10YR 5/1) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; strong very fine subangular blocky structure; firm; few fine roots; many small pores; thin patchy dark gray (10YR 4/1) clay films on faces of peds; many fine concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

Bt3—45 to 60 inches; gray (10YR 5/1) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; strong very fine subangular blocky structure; firm; few fine roots; many small pores; thick patchy dark gray (10YR 4/1) clay films on faces of peds and in voids; many fine concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

Thickness of the solum ranges from 60 to 75 inches. The Ap horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2). The A and E horizons range from very strongly acid to slightly acid where limed or to moderately alkaline where irrigated. The Bt horizon has hue of 10YR through 5Y, value of 5 or 6, and chroma of 1 or 2. The Bt horizon ranges from very strongly acid to neutral.

Doniphan series

The Doniphan series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in residuum weathered from cherty dolomite and clayey shale. Slopes range from 2 to 35 percent.

Doniphan soils are adjacent to Bardley, Captina, Clarksville, Gasconade, and Gatewood soils. Bardley, Gatewood, and Gasconade soils are in positions similar to those of the Doniphan soils but they are not so deep. Captina soils have a fragipan and are on broad ridgetops, upper side slopes, and foot slopes. Clarksville soils have more chert in the upper part of the subsoil and are on narrow ridgetops and upper side slopes.

Typical pedon in an area of Doniphan very cherty silt loam, 2 to 9 percent slopes, 1,240 feet south and 1,400 feet east of the NW corner of sec. 6, T. 21 N., R. 1 E., in Ripley County:

A—0 to 2 inches; dark grayish brown (10YR 4/2) very cherty silt loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; very friable; common medium roots; many small pores; many worm channels and casts; few fine concretions of manganese oxides; 60 percent chert fragments; slightly acid; abrupt smooth boundary.

E—2 to 12 inches; light yellowish brown (10YR 6/4) very cherty silt loam; many fine faint yellowish brown mottles; weak very fine granular structure; very friable; common medium and fine woody roots; many small pores; common worm channels and casts; common small concretions of manganese oxides; 55 percent chert fragments; strongly acid; clear wavy boundary.

BE—12 to 16 inches; yellowish red (5YR 5/8) cherty silty clay loam (B2t); light yellowish brown (10YR 6/4) silt loam (A2) comprises about 10 percent of the mass; moderate fine and very fine subangular blocky structure; very friable; common fine roots; many small pores; common worm channels and casts; thin patchy red (2.5YR 5/6) clay films on faces of peds; common small concretions of manganese oxides; 15 percent chert fragments; strongly acid; clear wavy boundary.

2Bt1—16 to 27 inches; red (2.5YR 4/6) clay; few fine prominent light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) mottles; strong fine angular blocky structure; friable; common fine woody roots; few small pores; few worm channels; thin patchy red (10R 4/6) clay films on faces of peds; few fine concretions of manganese oxides; few chert fragments; very strongly acid; clear wavy boundary.

2Bt2—27 to 41 inches; red (2.5YR 4/6) clay; common fine prominent light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) mottles; strong fine angular blocky structure; very firm; common fine woody roots; few small pores; few worm channels; thin patchy red (10R 4/6) clay films on faces of peds; few fine concretions of manganese oxides; less than 5 percent chert fragments; very strongly acid; clear wavy boundary.

2Bt3—41 to 55 inches; red (2.5YR 4/6) and brownish yellow (10YR 6/6) clay; common fine distinct strong brown (7.5YR 5/8) and few fine faint light yellowish brown (10YR 6/4) and light gray (10YR 7/2) mottles; moderate fine angular blocky structure; very firm; common fine woody roots; few small pores; few worm channels; thin patchy red (10R 4/6) clay films on faces of peds; few fine concretions of manganese oxides; few fine chert fragments; very strongly acid; abrupt wavy boundary.

2Bt4—55 to 77 inches; brownish yellow (10YR 6/6) clay; common coarse prominent red (10R 4/6) and light gray (N/7) and few fine faint light yellowish brown mottles; moderate fine and very fine angular blocky structure; very firm; common fine woody roots; few small pores; few worm channels; continuous clay films on faces of peds; few small concretions of manganese oxides; few fine chert fragments; very strongly acid.

Solum thickness ranges from about 60 to more than 100 inches.

The A horizon has hue of 10YR, value of 2 through 4, and chroma of 2 or 3. The chert content of the A and E horizons ranges from 25 to 75 percent. These horizons range from very strongly acid to slightly acid where limed. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The 2Bt1 and 2Bt2 horizons have hue of 7.5YR through 2.5YR, value of 4 or 5, and chroma of 6 or 8. The remaining part of the 2Bt horizon is variable and colors are mottled at most sites. The 2Bt horizon ranges from strongly acid to extremely acid.

Dubbs series

The Dubbs series consists of deep, well drained, moderately permeable soils on natural levees. These soils formed in silty alluvium. Slopes range from 0 to 5 percent.

Dubbs soils are adjacent to Calhoun, Foley, and Lafe soils. Calhoun, Foley, and Lafe soils are poorly drained and are in lower positions than Dubbs soils.

Typical pedon of Dubbs silt loam, 0 to 5 percent slopes, 530 feet east and 1,300 feet south of the NW corner of sec. 1, T. 25 N., R. 7 E., in Butler County:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak very thick platy structure parting to moderate very fine granular; very friable; many fine roots; many small pores; many worm channels and casts; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

BA—8 to 13 inches; brown (7.5YR 4/4) silt loam; moderate very fine subangular blocky structure; very friable; common fine roots; many small pores; many worm channels and casts; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

Bt1—13 to 19 inches; strong brown (7.5YR 5/6) silt loam; moderate very fine subangular blocky structure; very friable; few fine roots; many small pores; many worm channels and casts; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

Bt2—19 to 25 inches; strong brown (7.5YR 5/6) silt loam; moderate very fine and fine subangular blocky structure; very friable; few fine roots; many small pores; many worm channels and casts; thin patchy brown (7.5YR 4/4) clay films on faces of peds and in pores; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

Bt3—25 to 31 inches; strong brown (7.5YR 5/6) silt loam; many fine faint yellowish brown (10YR 5/6) and common fine distinct brown (10YR 5/3) mottles; moderate fine subangular blocky structure; very friable; few fine roots; many small pores; common skeletans; many worm channels and casts; thin patchy clay films on faces of peds and in pores; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

Bt4—31 to 47 inches; strong brown (7.5YR 5/6) silt loam; many fine yellowish brown (10YR 5/6) and few fine faint pale brown (10YR 6/3) and brown (10YR 5/3) mottles; moderate very fine and fine subangular blocky structure; very friable; few fine roots; many small pores; many worm channels and casts; thin patchy clay films in pores; common fine concretions of iron and manganese oxides; very strongly acid; clear smooth boundary.

BCt—47 to 60 inches; mixed yellowish brown (10YR 5/4) and very pale brown (10YR 7/3) silt loam; many fine distinct pale brown (10YR 6/3) and common fine distinct dark yellowish brown (10YR 4/6) mottles; moderate very fine and fine subangular blocky structure; very friable; few fine roots; common small pores; common worm channels; thin patchy clay films on faces of peds and in voids; many fine concretions of iron and manganese oxides; very strongly acid.

Solum thickness ranges from 20 to about 55 inches. Reaction of the solum ranges from medium acid through very strongly acid except where limed.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The Bt horizon is silt loam or silty clay loam.

Elk series

The Elk series consists of deep, well drained, moderately permeable soils on low terraces. These soils formed in silty alluvium. Slopes range from 1 to 4 percent.

Elk soils are similar to Nolin soils and are adjacent to Adler, Calhoun, Hontas, Midco, and Nolin soils. Adler, Calhoun, and Hontas soils are on lower positions and are not so well drained as Elk soils. Midco soils have chert throughout the solum. They are on positions adjacent to drainageways. Nolin soils have less clay in the subsoil and do not have argillic horizons.

Typical pedon in an area of Elk silt loam, 1 to 4 percent slopes, 300 feet west and 90 feet north of the SE corner of sec. 4, T. 22., R. 2 E., in Ripley County:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium platy structure; very friable; common fine roots; many small pores; many worm channels and casts; common small concretions of iron and manganese oxides; neutral; abrupt smooth boundary.

Bt1—7 to 13 inches; brown (7.5YR 4/4) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak very fine subangular blocky structure; friable; common fine roots; many small pores; many worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

Bt2—13 to 19 inches; brown (7.5YR 4/4) silt loam; many fine distinct strong brown (7.5YR 5/6) mottles; moderate very fine subangular blocky structure; friable; common fine roots; many small pores; many worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

Bt3—19 to 28 inches; brown (7.5YR 4/4) silty clay loam; discontinuous reddish brown (5YR 4/4) coats on faces of peds; many fine distinct strong brown (7.5YR 5/6) mottles; moderate very fine subangular blocky structure; firm; common fine roots; many small pores; many worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; medium acid; clear smooth boundary.

Bt4—28 to 46 inches; brown (7.5YR 4/4) silt loam; discontinuous reddish brown (5YR 4/4) coats on faces of peds; many fine distinct strong brown (7.5YR 5/6) mottles; weak very fine subangular blocky structure; friable; common fine roots; many small pores; many worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; medium acid; clear smooth boundary.

Bt5—46 to 60 inches; brown (7.5YR 4/4) silt loam; many fine distinct strong brown (7.5YR 5/6) mottles; weak very fine subangular blocky structure; friable; many fine pores; many worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; medium acid.

Solum thickness ranges from 50 to 60 inches. The solum is from 0 to 5 percent pebbles, by volume. It is medium acid or slightly acid except for the A horizon, which can be neutral where limed.

The Ap or A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The A horizon ranges from 7 to 12 inches in thickness. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Foley series

The Foley series consists of deep, poorly drained, very slowly permeable soils on natural levees. These soils formed in silty alluvium that was high in content of sodium and magnesium. Slopes are 0 to 2 percent.

Foley soils are similar to Lafe soils and are adjacent to Calhoun, Crowley, Dubbs, and Houlka soils. Lafe soils are browner than Foley soils and are somewhat poorly drained. The Calhoun, Crowley, and Houlka soils do not have natric horizons, and they are in lower positions than Foley soils. The Dubbs soils are well drained and are on higher positions.

Typical pedon in an area of Foley silt loam, 2,110 feet north and 77 feet west of the SW corner of sec. 3, T. 22 N., R. 7 E., in Butler County:

Ap—0 to 4 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak medium platy structure parting to moderate very fine granular; very friable; many fine roots; many small pores; few worm channels and casts; common fine concretions of iron and manganese oxides; neutral; abrupt smooth boundary.

Eg—4 to 8 inches; light brownish gray (10YR 6/2) silt loam; common fine faint pale brown (10YR 6/3) mottles; weak medium platy structure parting to moderate very fine granular; very friable; few fine roots; many small pores; few worm channels and casts; common fine concretions of iron and manganese oxides; medium acid; abrupt wavy boundary.

BEg—8 to 13 inches; light brownish gray (2.5Y 6/2) silt loam (Btg); many tongues and pockets of light brownish gray (10YR 6/2) silt loam (Eg) comprises about 15 percent of the horizon; common fine faint pale brown (10YR 6/3) mottles; weak medium prismatic structure parting to moderate very fine subangular blocky; firm; few fine roots; many small pores; thin patchy clay films on faces of peds and in pores; many fine and medium concretions of iron and manganese oxides; medium acid; clear wavy boundary.

Btg—13 to 24 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct light yellowish brown (2.5Y 6/4), few fine distinct light gray (10YR 7/2), and few medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate very fine subangular blocky; firm; common fine roots; common small pores; thick clay films on faces of peds and in pores and old root channels; common fine concretions of iron and manganese oxides; neutral; clear smooth boundary.

Btg2—24 to 39 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct light yellowish brown (10YR 6/4) and few fine distinct light gray (10YR 7/2) mottles; weak medium prismatic structure parting to moderate very fine subangular blocky; very firm; few fine roots; common small pores; thick clay films on faces of peds and in pores and old root channels; common fine and a few medium concretions of iron and manganese oxides; moderately alkaline; clear smooth boundary.

Btg3—39 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine faint light gray (10YR 7/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate very fine subangular blocky; very firm; few fine roots; few small pores; thick clay films on faces of peds and in pores and old root channels; many fine and medium concretions of iron and manganese oxides; moderately alkaline.

The thickness of the solum is 60 inches or more. The natric horizon is within 7 to 16 inches of the upper boundary of the B horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 through 3. The Eg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Reaction in the A and E horizons ranges from very strongly acid to neutral. The Btg horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2. Reaction in the Btg1 horizon is strongly acid to neutral. Reaction in the Btg2 and Btg3 horizons ranges from neutral to strongly alkaline.

Gasconade series

The Gasconade series consists of shallow, somewhat excessively drained soils on uplands. Permeability is moderately slow. These soils formed in residuum weathered from clayey shale and limestone. Slopes range from 2 to 30 percent.

The Gasconade soils are adjacent to Captina, Doniphan, and Gatewood soils. Captina soils have a fragipan and are on broad ridges. Doniphan soils are deep, and Gatewood soils are moderately deep. Both Doniphan and Gatewood soils are in positions on the landscape similar to those of the Gasconade soils.

Typical pedon of Gasconade flaggy silty clay loam in an area of Gasconade-Rock outcrop complex, 2 to 14 percent slopes, 600 feet east and 2,140 feet north of the SW corner of sec. 4, T. 22 N., R. 1 W., in Ripley County:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) flaggy silty clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; friable; many fine roots; many small pores; many worm channels and casts; common medium concretions of iron and manganese oxides; 60 percent coarse fragments; neutral; abrupt smooth boundary.

B—4 to 8 inches; very dark grayish brown (10YR 3/2) flaggy silty clay loam, dark grayish brown (10YR 4/2) dry; dark brown (7.5YR 3/2) coats on faces of peds; moderate very fine subangular blocky structure; firm; many fine roots; common small pores; many worm channels and casts; common medium concretions of iron and manganese oxides; 75 percent coarse fragments; neutral; abrupt smooth boundary.

R—8 inches; limestone.

Thickness of the solum ranges from 4 to 20 inches and coincides with the depth to limestone bedrock. Reaction of the solum ranges from slightly acid through mildly alkaline. The content of coarse fragments more than 3 inches in diameter ranges from 35 to 60 percent in any horizon.

The A horizon has hue of 10YR, value of 3, and chroma of 1 through 3. The B horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 through 4. Clay content of the B horizon ranges from 35 to 50 percent.

Gatewood series

The Gatewood series consists of moderately deep, moderately well drained, slowly permeable soils on uplands. These soils formed in residuum weathered from cherty dolomite and shale. Slopes range from 2 to 9 percent.

Gatewood soils are similar to Bardley soils and are adjacent to Clarksville, Doniphan, and Gasconade soils. Bardley soils are well drained. Clarksville soils are deep and cherty throughout. Doniphan soils are deep and well drained. Gasconade soils are shallow to bedrock. Clarksville, Doniphan, and Gasconade soils are in positions on the landscape similar to those of Gatewood soils.

Typical pedon in an area of Gatewood cherty silt loam, 2 to 9 percent slopes, 2,100 feet south and 1,730 feet west of the NE corner of sec. 4, T. 22 N., R. 1 W., in Ripley County:

A—0 to 2 inches; dark grayish brown (10YR 4/2) cherty silt loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; very friable; many medium and fine roots; 30 percent chert fragments; slightly acid; abrupt wavy boundary.

E—2 to 5 inches; pale brown (10YR 6/3) silt loam; few fine prominent yellowish brown (10YR 5/8) motties; weak thin platy structure parting to moderate very fine granular; very friable; many medium and fine roots; 15 percent chert fragments; medium acid; clear wavy boundary.

Bt1—5 to 10 inches; yellowish brown (10YR 5/6) clay; moderate very fine angular blocky structure; firm; common fine roots; few thin patchy yellowish brown (10YR 5/4) clay films; 5 percent chert fragments; strongly acid; gradual smooth boundary.

Bt2—10 to 19 inches; yellowish brown (10YR 5/6) clay; moderate very fine angular blocky structure; firm; common fine roots; thin continuous yellowish brown (10YR 5/4) clay films; 5 percent chert fragments; strongly acid; gradual wavy boundary.

Bt3—19 to 29 inches; yellowish brown (10YR 5/8) clay; few fine prominent pale olive (5Y 6/3) mottles; weak fine angular blocky structure; very firm; common fine roots; common shiny pressure faces; 15 percent chert fragments; strongly acid; gradual irregular boundary.

Bt4—29 to 36 inches; brownish yellow (10YR 6/6) clay; few medium prominent brown (7.5YR 5/4) and common medium distinct light olive brown (2.5Y 5/4) mottles; massive; very firm; few fine roots; common very dark grayish brown (10YR 3/2) stains; weathered dolomite bedrock makes up about 50 percent of the volume; neutral; clear irregular boundary.

R—36 inches; dolomite.

Depth to bedrock ranges from 20 to 40 inches.

The A horizon has hue of 10YR, value of 2 through 4, and chroma of 2 through 4. The E horizon has hue of 10YR, value of 4 through 6, and chroma of 3 or 4. The chert content of the A and E horizons ranges from 15 to 75 percent. These horizons range from strongly acid to slightly acid. The Bt horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. Reaction is strongly acid or medium acid but ranges to neutral in the lower part.

Hartville series

The Hartville series consists of deep, somewhat poorly drained, slowly permeable soils on terraces along major stream valleys. These soils formed in silty and clayey alluvium. Slopes range from 1 to 4 percent.

Hartville soils are adjacent to Captina, Elk, Hontas, and Secesh soils. Captina soils have a fragipan and are on higher positions than Hartville soils. Elk and Secesh soils are well drained and are in lower positions. Hontas soils are moderately well drained, have less clay in the subsoil, and are in lower positions.

Typical pedon in an area of Hartville silt loam, 1 to 4 percent slopes, 340 feet north and 215 feet east of the SW corner of sec. 33, T. 25 N., R. 3 E., in Ripley County:

Ap—0 to 10 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate fine granular structure; very friable; many fine roots; many small pores; pale brown (10YR 6/3) silt coats on faces of peds; yellowish brown (10YR 5/4) stains; common worm channels and casts; common fine concretions of iron and manganese oxides; medium acid; clear smooth boundary.

Bt1—10 to 17 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct light gray (10YR 7/2) mottles; weak thick platy structure parting to moderate very fine subangular blocky; very friable; common fine roots; common small pores; yellowish brown (10YR 5/4) stains; common worm channels and casts; few thin clay films on faces of peds; many fine concretions of iron and manganese oxides; 5 percent fine chert fragments; strongly acid; abrupt smooth boundary.

Bt2—17 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine faint grayish brown (10YR 5/2) and common fine distinct strong brown (7.5YR 5/6-5/8) mottles; moderate very fine subangular blocky structure; firm; few fine roots; common small pores; light gray (10YR 7/2) silt coats on faces of peds; few worm channels and casts; thick clay films on faces of peds; many fine and few large concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

Bt3—26 to 30 inches; mottled grayish brown (10YR 5/2) and strong brown (7.5YR 5/6-5/8) silty clay; moderate fine and very fine subangular blocky structure; firm; few fine roots; common small pores; few worm channels and casts; thick patchy clay films on faces of peds; many fine and large concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt4—30 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common fine faint pale brown (10YR 6/3), light gray (10YR 7/2), and common fine prominent strong brown (7.5YR 5/8) mottles; moderate very fine subangular blocky structure; firm; few fine roots; common small pores; thick patchy clay films on faces of peds; many fine concretions of iron and manganese oxides; 10 percent very fine chert fragments; medium acid.

The thickness of the solum is 60 inches or more.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 4. Reaction ranges from very strongly acid to slightly acid. It is slightly acid if limed. The upper part of the Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The lower part of the Bt horizon has hue of 10YR or 7.5YR, value of 5 through 7 and chroma of 1 through 8. The Bt horizon is very strongly acid through medium acid.

Hontas series

The Hontas series consists of deep, moderately well drained, moderately permeable soils on first bottoms along the major stream valleys. These soils formed in silty sediment. Slopes range from 0 to 1 percent.

Hontas soils are adjacent to Elk, Midco, Nolin, and Secesh soils. Elk, Nolin, and Secesh soils are well drained and are not so gray as Hontas soils. They are on slightly higher positions in the landscape. Midco soils are somewhat excessively drained and are gravelly throughout. They are on positions similar to those of Hontas soils.

Typical pedon in an area of Hontas silt loam, 330 feet north and 660 feet west of the SE corner of sec. 12, T. 25 N., R. 5 E., in Butler County:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; many fine and medium roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

A—9 to 16 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak very fine granular structure; very friable; common fine roots; many small pores; common worm channels and casts; common fine and medium concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

BA—16 to 21 inches; brown (10YR 5/3) silt loam; common fine faint light gray (10YR 7/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; friable; common fine roots; many small pores; common worm channels and casts; common fine and medium concretions of iron and manganese oxides; medium acid; clear smooth boundary.

Bw—21 to 35 inches; brown (10YR 5/3) silt loam; many fine faint light gray (10YR 7/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; friable; few fine roots; many small pores; common worm channels and casts; light yellowish brown (2.5Y 6/4) coats on faces of peds; common fine and medium concretions of iron and manganese oxides; medium acid; gradual smooth boundary.

C1—35 to 47 inches; grayish brown (10YR 5/2) silt loam; many fine distinct very pale brown (10YR 7/4) and prominent yellowish brown (10YR 5/6), and common fine faint light grayish brown (10YR 6/2) mottles; massive; friable; few fine roots; many small pores; common worm channels and casts; many fine and medium concretions of iron and manganese oxides; mildly alkaline; gradual smooth boundary.

C2—47 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; many fine distinct very pale brown (10YR 7/4), common fine prominent yellowish brown (10YR 5/6), and few fine faint light gray mottles; massive; firm; few fine roots; many small pores; few worm channels and casts; many fine and medium concretions of iron and manganese oxides; mildly alkaline.

Thickness of the solum ranges from 30 to more than 50 inches. Reaction of the A horizon ranges from medium acid to neutral. Reaction of the Bw horizon ranges from medium acid to mildly alkaline.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2.

Houlka series

The Houlka series consists of deep, somewhat poorly drained, very slowly permeable soils on natural levees and low terraces. These soils formed in clayey and silty sediment. Slopes range from 0 to 1 percent.

Houlka soils are similar to Kobel soils and are adjacent to Amagon, Calhoun, Crowley, Foley, and Lafe soils. Kobel soils are acid. All of the adjacent soils have less clay in the surface layer than the Houlka soils and are on slightly higher positions.

Typical pedon in an area of Houlka silty clay loam, 245 feet west and 258 feet south of the NE corner of sec. 27, T. 22 N., R. 7 E., in Butler County:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, grayish brown (10YR 5/2) dry; discontinuous very dark grayish brown (10YR 3/2) coats on faces of peds; strong very fine and fine subangular blocky structure; firm; many fine roots; many small pores; many fine concretions of iron and manganese oxides; neutral; gradual wavy boundary.

Bwg1—7 to 12 inches; grayish brown (10YR 5/2) silty clay loam, light gray (10YR 7/2) dry; strong very fine subangular blocky structure; firm; many fine roots; many small pores; many fine concretions of iron and manganese oxides; strongly acid; abrupt smooth boundary.

Bwg2—12 to 24 inches; grayish brown (10YR 5/2) silty clay; many fine distinct strong brown (7.5YR 5/6) mottles; strong very fine subangular blocky structure; very firm; common fine roots; many small pores; many fine concretions of iron and manganese oxides; very strongly acid; gradual wavy boundary.

Bwg3—24 to 52 inches; grayish brown (2.5Y 5/2) silty clay; common fine faint light brownish gray (10YR 6/2) and common fine prominent yellowish brown (10YR 5/6) mottles; strong very fine subangular blocky structure; very firm; common fine roots; many small pores; common fine concretions of iron and manganese oxides; very strongly acid; gradual smooth boundary.

Cg—52 to 60 inches; olive gray (5Y 5/2) silty clay; common fine faint light brownish gray (10YR 6/2) and common fine prominent yellowish brown (10YR 5/6) mottles; massive; very firm; few fine roots; many small pores; common fine concretions of iron and manganese oxides; strongly acid.

Thickness of the solum is 30 to 55 inches. The solum is very strongly acid or strongly acid unless limed.

The Bwg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2.

Kobel series

The Kobel series consists of deep, poorly drained, very slowly permeable soils in narrow to broad basins on natural levees or low terraces. These soils formed in clayey alluvium. Slopes range from 0 to 1 percent.

Kobel soils are similar to Houlka soils and are adjacent to Amagon, Calhoun, and Tuckerman soils. Houlka soils are acid and are in positions on the landscape similar to those of Kobel soils. Amagon and Calhoun soils are less clayey throughout and are on slightly higher positions. Tuckerman soils have more sand throughout the solum and are on higher positions.

Typical pedon in an area of Kobel clay, 890 feet east and 365 feet south of the NW corner of sec. 28, T. 23 N., R. 7 E., in Butler County:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) clay, gray (10YR 5/1) dry; strong very fine subangular blocky structure; firm; common fine roots; many small pores; many fine concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

Bwg—8 to 37 inches; gray (10YR 5/1) clay; common fine faint dark gray (10YR 4/1) coats on faces of peds; common fine distinct yellowish brown (10YR 5/4) mottles; strong very fine subangular blocky structure; very firm; a few fine roots; common fine pores; many fine concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

Bwg—37 to 56 inches; gray (10YR 5/1) clay; common fine distinct yellowish brown (10YR 5/4) mottles; strong very fine subangular blocky structure; very firm; a few fine roots; common fine pores; many fine concretions of iron and manganese oxides; a few calcium carbonate concretions; neutral; clear smooth boundary.

Cg—56 to 60 inches; gray (10YR 5/1) clay; common fine distinct yellowish brown (10YR 5/4) and brown (7.5YR 4/4) mottles; moderate very fine subangular blocky structure; firm; a few fine roots; common fine pores; thin patchy clay films on faces of peds; many fine concretions of iron and manganese oxides; a few calcium carbonate concretions; neutral.

The solum thickness ranges from 30 to 60 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 1 or 2. It is very strongly acid to neutral. The Bwg horizon has hue of 10YR or 5Y, value of 4 through 6, and chroma of 1. The clay content ranges from 40 to 60 percent. The Bwg horizon is slightly acid or neutral.

Lafe series

The Lafe series consists of deep, somewhat poorly drained, very slowly permeable soils on low terraces. These soils have high sodium content throughout the subsoil. They formed in silty alluvium. Slopes range from 0 to 2 percent.

Lafe soils are adjacent to Calhoun, Crowley, Dubbs, and Foley soils. Calhoun, Crowley, and Foley soils have gray subsoils and are in lower positions than Lafe soils. Dubbs soils are well drained and on higher positions.

Typical pedon in an area of Lafe silt loam, 185 feet west and 2,400 feet north of the SE corner of sec. 29, T. 22 N., R. 7 E., in Butler County:

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; few fine distinct light gray (10YR 7/2) mottles; moderate thin platy structure; very friable; common fine roots; many small pores; few worm channels; many fine concretions of iron and manganese oxides; slightly acid; abrupt smooth boundary.

B/E—5 to 25 inches; pale brown (10YR 6/3) silty clay loam (Bt) and light gray (10YR 7/2) silt loam (E), which comprises 15 percent of the horizon; moderate medium columnar structure parting to strong very fine and fine subangular blocky; the silt loam has strong thin platy structure; very firm; common fine roots; common small pores; few worm channels; thick patchy clay films on faces of peds and in voids; common fine concretions of iron and manganese oxides; moderately alkaline; clear smooth boundary.

Bt1—25 to 35 inches; pale brown (10YR 6/3) silty clay loam and pockets of light gray (10YR 7/2) silt loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to strong very fine and fine subangular blocky; very firm; common fine roots; common small pores; few worm channels; thick patchy clay films on faces of peds and in voids; common fine concretions of iron and manganese oxides; strongly alkaline; clear smooth boundary.

Bt2—35 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate very fine and fine subangular blocky; firm; few fine roots; common small pores; few worm channels; thick patchy clay films on faces of peds and in voids; common fine concretions of iron and manganese oxides; strongly alkaline; clear smooth boundary.

Thickness of the solum ranges from 38 to 60 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 2. Reaction in the A and E horizons is strongly acid to slightly acid. The Bt1 horizon has hue of 10YR, value of 6, and chroma of 3 or 4. The Bt2 horizon has hue of 10YR, value of 6, and chroma of 2 or 3. Reaction in the Bt horizon is mildly alkaline through strongly alkaline.

Loring series

The Loring series consists of moderately well drained soils that have a fragipan at a moderate depth. Permeability is moderately slow through the fragipan. These soils formed in loess on uplands. Slopes range from 2 to 14 percent.

Loring soils are similar to Captina soils and are adjacent to Adler, Captina, and Clarksville soils. Captina soils have more clay in the lower part of the profile and have chert in the fragipan. Adler soils do not have a fragipan and are on flood plains. Clarksville soils are cherty, do not have a fragipan, and are on narrow ridgetops and side slopes.

Typical pedon in an area of Loring silt loam, 2 to 5 percent slopes, 1,320 feet north and 20 feet east of the SW corner of sec. 17, T. 23 N., R. 4 E., in Ripley County:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; light yellowish brown (10YR 6/4) dry; moderate fine and very fine granular structure; very friable; many very fine roots; many small pores; common worm channels and casts; few fine concretions of iron and manganese oxides; medium acid; clear smooth boundary.

BA—6 to 9 inches; yellowish brown (10YR 5/6) silt loam; moderate very fine subangular blocky structure; very friable; many medium roots; many small pores; common worm channels and casts; few fine concretions of iron and manganese oxides; medium acid; clear smooth boundary.

Bt1—9 to 16 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine subangular blocky structure; friable; common medium roots; many small pores; common worm channels and casts; very pale brown (10YR 7/4) silt coatings in root channels; thin patchy clay films on faces of peds; few fine concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt2—16 to 21 inches; strong brown (7.5YR 5/6) silty clay loam; few medium distinct very pale brown (10YR 7/4) mottles; moderate fine subangular blocky structure; friable; common medium roots; many small pores; common worm channels and casts; thin patchy clay films in pores; few fine concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt3—21 to 25 inches; strong brown (7.5YR 5/6) silty clay loam; many coarse prominent pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; common medium roots; many small pores; common worm channels and casts; thin continuous brown (7.5YR 4/4) clay films on faces of peds; few fine concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt4—25 to 33 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and brown (7.5YR 5/8) silty clay loam; moderate coarse angular and subangular blocky structure; firm; common medium roots; many small pores; common worm channels and casts; thick continuous brown (7.5YR 4/4) clay films on faces of peds; common fine concretions of iron and manganese oxides; medium acid; clear smooth boundary.

Bx1—33 to 46 inches; strong brown (7.5YR 5/6) silt loam; very coarse prismatic structure parting to moderate medium subangular blocky structure in the upper part; very firm in place, brittle when broken out; few fine roots between prisms; many small pores; thick continuous dark yellowish brown (10YR 4/4) clay films on faces of prisms; tapering wedges of brown (10YR 5/3) silt loam separate prisms and strong brown (7.5YR 5/8) streaks are along prism faces; many fine concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bx2—46 to 60 inches; yellowish brown (10YR 5/6) silt loam; very coarse prismatic structure parting to weak thick platy; extremely firm in place, brittle when broken out; few fine roots between prisms; many small pores; tapering wedges of pale brown (10YR 6/3) silt loam separate prisms and strong brown (7.5YR 5/8) streaks along prism faces; many fine concretions of iron and manganese oxides; medium acid.

Thickness of the solum ranges from 45 to 70 inches. The depth to the fragipan ranges from 26 to 35 inches. Reaction is medium acid to very strongly acid except where limed.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 6. The BA and Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The Bx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 6. It is silt loam or silty clay loam.

Midco series

The Midco series consists of deep, somewhat excessively drained soils on first bottoms along streams. Permeability is moderately rapid. These soils formed in recent, cherty, alluvial sediment. Slopes range from 1 to 3 percent.

Midco soils are adjacent to Adler, Elk, Hontas, Nolin, and Secesh soils. Not all of the adjacent soils have the high chert content of the Midco soils.

Typical pedon in an area of Midco cherty loam, 1 to 3 percent slopes, 1,715 feet east and 395 north of the SW corner of sec. 22, T. 25 N., R. 5 E., in Butler County:

A—0 to 9 inches; dark grayish brown (10YR 4/2) cherty loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; very friable; many coarse roots; common small pores; a few worm channels and casts; common fine concretions of iron and manganese oxides; 45 percent chert fragments; slightly acid; abrupt smooth boundary.

C1—9 to 17 inches; brown (7.5YR 4/4) very cherty sandy loam; massive; very friable; common coarse roots; common small pores; a few worm channels and casts; common fine concretions of iron and manganese oxides; 50 percent chert fragments; medium acid; abrupt wavy boundary.

C2—17 to 22 inches; brown (7.5YR 4/4) very cherty loam; massive; very friable; common coarse roots; common small pores; a few worm channels and casts; common fine concretions of iron and manganese oxides; 85 percent chert fragments; medium acid; abrupt wavy boundary.

C3—22 to 38 inches; brown (7.5YR 4/4) very cherty loam; discontinuous strong brown (7.5YR 4/6) coats on faces of peds; massive; very friable; common coarse roots; common small pores; a few worm channels and casts; common fine concretions of iron and manganese oxides; 65 percent chert fragments; medium acid; abrupt wavy boundary.

C4—38 to 60 inches; strong brown (7.5YR 5/6) very cherty sandy loam; weak thick platy structure; very friable; common coarse roots; common small pores; a few worm channels and casts; common fine concretions of iron and manganese oxides; 50 percent chert fragments; medium acid.

The thickness of the solum ranges from 4 to 10 inches.

The A horizon has value of 3 or 4 and chroma of 2. Chert content ranges from about 20 to 75 percent. Reaction of the A horizon is medium acid or slightly acid where limed. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. Chert content ranges from 35 to 75 percent. Reaction of the C horizon ranges from strongly acid through slightly acid.

Nolin series

The Nolin series consists of deep, well drained, moderately permeable soils on first bottoms along the major stream valleys. These soils formed in silty alluvial sediment. Slopes range from 0 to 2 percent.

Nolin soils are similar to Elk soils and are adjacent to Adler, Elk, Hontas, Midco, Secesh, and Wideman soils. Adler and Hontas soils are moderately well drained. They are on lower positions than Nolin soils and in depressional areas. Elk soils contain more clay in the subsoil and have argillic horizons. Midco and Secesh soils are on positions similar to those of the Nolin soils, but they have high chert content. Wideman soils have higher sand content than Nolin soils and are on higher positions.

Typical pedon in an area of Nolin silt loam, 1,300 feet north and 510 feet west of the center of sec. 6, T. 22 N., R. 4 E., in Ripley County:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate thin platy structure parting to weak very fine granular; very friable; many fine roots; many small pores; many worm channels and casts; common fine concretions of iron and manganese oxides; many fine faint brown (10YR 5/3) stains; medium acid; abrupt smooth boundary.

Bw1—7 to 30 inches; brown (10YR 4/3) silt loam; dark brown (7.5YR 4/2) discontinuous coats on faces of peds; weak very fine subangular blocky structure; very friable; many fine roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; slightly acid; gradual wavy boundary.

Bw2—30 to 60 inches; brown (10YR 4/3) silt loam; dark brown (7.5YR 4/2) discontinuous coats on faces of peds; many fine faint brown (10YR 5/3) mottles; few fine distinct pale brown (10YR 6/3) mottles; moderate very fine subangular blocky structure; friable; few coarse roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; slightly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Reaction ranges from medium acid to mildly alkaline. Chert content ranges from 0 to 5 percent.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Peridge series

The Peridge series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in thin loess and residuum weathered from cherty dolomite. Slopes range from 2 to 9 percent.

Peridge soils are adjacent to Captina, Clarksville, Doniphan, Elk, Hartville, and Secesh soils. Captina soils have a fragipan and are on higher positions than Peridge soils. Clarksville and Doniphan soils have a cherty surface layer and are on positions above the Peridge soils. Elk and Secesh soils have less clay in the subsoil and are in lower positions. Hartville soils are somewhat poorly drained and also are in lower positions.

Typical pedon in an area of Peridge silt loam, 2 to 5 percent slopes, 1,570 feet north and 1,055 feet east of the SW corner of sec. 5, T. 22 N., R. 1 E., in Ripley County:

Ap1—0 to 4 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; many fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium platy structure parting to weak very fine granular; very friable; many fine roots; many small pores; common worm channels and casts; common small concretions of iron and manganese oxides; strongly acid; abrupt smooth boundary.

Ap2—4 to 8 inches; brown (7.5YR 4/4) silt loam, light brown (7.5YR 6/4) dry; many fine distinct dark yellowish brown (10YR 4/4) and few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium platy structure parting to weak very fine granular; very friable; many fine roots; many small pores; common worm channels and casts; common small concretions of iron and manganese oxides; strongly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; strong brown (7.5YR 5/6) silty clay loam; discontinuous reddish brown (5YR 4/4) coats on faces of peds; moderate very fine subangular blocky structure; firm; common fine roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt2—16 to 29 inches; yellowish red (5YR 4/6) silty clay loam; discontinuous reddish brown (5YR 4/4) coats on faces of peds; moderate very fine subangular blocky structure; firm; common fine roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common small concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt3—29 to 47 inches; yellowish red (5YR 4/6) silty clay loam; discontinuous reddish brown (5YR 4/4) coats on faces of peds; moderate very fine and fine subangular blocky structure; firm; few fine roots; many small pores; common worm channels; thin patchy reddish brown (2.5YR 4/4) clay films on faces of peds; common small concretions of iron and manganese oxides; strongly acid; clear smooth boundary.

Bt4—47 to 60 inches; yellowish red (5YR 4/6) silty clay loam; moderate very fine and fine subangular blocky structure; firm; few fine roots; many small pores; common worm channels; moderately thick reddish brown (2.5YR 4/4) clay films on faces of peds; common small concretions of iron and manganese oxides; strongly acid.

The thickness of the solum ranges from 60 to 72 inches. Chert content ranges from 0 to 5 percent to a depth of 40 inches and from 0 to 35 percent below. Reaction ranges from very strongly acid to medium acid throughout the solum.

The A horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4. The Bt horizon has hue of 5YR or 2.5YR, value of 4, and chroma of 6 or 8.

Secesh series

The Secesh series consists of deep, well drained, moderately permeable soils on first bottoms along stream valleys. These soils formed in silty and loamy material. Slopes are less than 2 percent.

Secesh soils are adjacent to Calhoun, Elk, Hartville, Hontas, Midco, and Nolin soils. The poorly drained Calhoun and the moderately well drained Hontas soils are on lower positions than Secesh soils. They are in depressional areas. The Elk and Nolin soils have a lower chert content in the lower part of the subsoil than Secesh soils. They are on higher positions. The somewhat poorly drained Hartville soils are also on higher positions in the landscape. They are directly adjacent to the uplands. The Midco soils have more gravel throughout and are on positions similar to those of the Secesh soils.

Typical pedon in an area of Secesh silt loam, 620 feet west and 540 feet south of the NE corner of sec. 30, T. 25 N., R. 4 E., in Ripley County:

Ap1—0 to 3 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; moderate very fine granular structure; very friable; many fine and medium roots; many small pores; many worm channels and casts; few fine concretions of iron and manganese oxides; strongly acid; abrupt smooth boundary.

Ap2—3 to 8 inches; dark brown (10YR 4/3) silt loam; moderate very fine granular structure; very friable; many fine and medium roots; many small pores; many worm channels and casts; few fine and medium concretions of iron and manganese oxides; strongly acid; abrupt smooth boundary.

BA—8 to 13 inches; brown (7.5YR 5/4) silt loam; dark brown (7.5YR 4/4) coats on faces of peds; moderate very fine subangular blocky structure; very friable; many fine roots; many small pores; many worm channels and casts; few fine and medium concretions of iron and manganese oxides; strongly acid; clear wavy boundary.

Bt1—13 to 18 inches; strong brown (7.5YR 5/6) silt loam; strong brown (7.5YR 4/6) coats on faces of peds; moderate very fine subangular blocky structure; very friable; many fine roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; many fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

Bt2—18 to 22 inches; strong brown (7.5YR 5/6) silty clay loam; strong brown (7.5YR 4/6) coats on faces of peds; moderate very fine subangular blocky structure; friable; common fine roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; many fine concretions of iron and manganese oxides; 10 percent chert fragments; very strongly acid; abrupt smooth boundary.

2Bt3—22 to 31 inches; yellowish brown (10YR 5/4) very cherty clay loam; many fine distinct strong brown (7.5YR 4/6) mottles; few fine faint brown mottles; moderate very fine subangular blocky structure; friable; few fine roots; many small pores; thin patchy clay films on faces of peds; many large concretions of iron and manganese oxides; 55 percent chert fragments; very strongly acid; clear wavy boundary.

2Bt4—31 to 60 inches; yellowish brown (10YR 5/4) very cherty clay loam; many fine distinct strong brown (7.5YR 4/6) and few fine faint brown mottles; moderate very fine subangular blocky structure; friable; few fine roots; many small pores; thin patchy clay films on faces of peds; many large concretions of iron and manganese oxides; 75 percent chert fragments; very strongly acid.

The thickness of the solum is 60 inches or more. Reaction ranges from slightly acid to very strongly acid.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. Chert content is less than 15 percent. The B horizon has hue of 10YR and 7.5YR, value of 4 or 5, and chroma of 4 through 6.

Tuckerman series

The Tuckerman series consists of deep, poorly drained soils on low terraces. Permeability is moderately slow. These soils formed in loamy, alluvial sediment. Slopes range from 0 to 2 percent.

Tuckerman soils are adjacent to Amagon, Bosket, Calhoun, Foley, and Kobel soils. The Amagon, Calhoun, and Foley soils do not have the high content of sand typical of Tuckerman soils, and they are in lower positions. Bosket soils are well drained and are on higher positions. The Kobel soils have more clay than Tuckerman soils and are in lower positions in old stream channels and slack water areas.

Typical pedon in an area of Tuckerman fine sandy loam, 1,300 feet south and 400 feet east of the NW corner of sec. 31, T. 22 N., R. 5 E., in Ripley County:

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; many fine faint very dark grayish brown (10YR 3/2) mottles; weak medium platy structure; very friable; fine roots; many small pores; few worm channels and casts; common fine concretions of iron and manganese oxides; very strongly acid; abrupt smooth boundary.

Ap2—3 to 13 inches; grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; many fine faint light brownish gray (10YR 6/2) mottles; weak medium platy structure; very friable; common fine roots; many small pores; few worm channels and casts; many fine concretions of iron and manganese oxides; very strongly acid; abrupt wavy boundary.

BAg—13 to 19 inches; light brownish gray (10YR 6/2) fine sandy loam; many fine faint grayish brown (10YR 5/2) mottles; weak very fine subangular blocky structure; friable; common fine roots; many small pores; moderately thick clay films bridging sand grains; many fine concretions of iron and manganese oxides; common fine distinct dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/4) concretionary stains; very strongly acid; abrupt wavy boundary.

Btg1—19 to 30 inches; light brownish gray (10YR 6/2) sandy clay loam; discontinuous dark gray (10YR 4/1) coats on faces of peds; moderate very fine subangular blocky structure; firm; common fine roots; many small pores; moderately thick clay films on faces of peds; many small concretions of iron and manganese oxides; common fine distinct dark yellowish brown (10YR 3/4) concretionary stains; very strongly acid; clear smooth boundary.

Btg2—30 to 49 inches; gray (10YR 5/1) sandy clay loam; discontinuous dark gray (10YR 4/1) coats on faces of peds; medium very fine subangular blocky structure; firm; common fine roots; many small pores; moderately thick clay films on faces of peds; many fine concretions of iron and manganese oxides; common fine distinct dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/4) concretionary stains; very strongly acid; clear smooth boundary.

Cg—49 to 60 inches; gray (10YR 5/1) fine sandy loam; discontinuous dark gray (10YR 4/1) coats on faces of peds; massive; firm; few fine roots; many small pores; many fine concretions of iron and manganese oxides; common fine distinct dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/4) concretionary stains; medium acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction ranges from very strongly acid to medium acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The Btg horizon has hue of 10YR, value of 5 through 6, and chroma of 1 or 2. It is sandy clay loam or loam.

Wideman series

The Wideman series consists of deep, excessively drained soils on flood plains and natural levees. Permeability is moderately rapid. These soils formed in sandy alluvium. Slopes range from 0 to 5 percent.

Wideman soils are adjacent to Elk, Midco, and Nolin soils. Elk and Nolin soils have finer textured subsoils than Wideman soils and are on both higher and lower positions on the flood plains. Midco soils are cherty throughout and are in lower positions.

Typical pedon in an area of Wideman fine sandy loam, 0 to 5 percent slopes, 1,980 feet south and 1,107 feet east of the NW corner of sec. 13, T. 26 N., R. 5 E., in Butler County:

Ap—0 to 9 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak medium platy structure; very friable; many fine roots; many small pores; few worm channels and casts; medium acid; abrupt smooth boundary.

C1—9 to 13 inches; dark yellowish brown (10YR 4/4) fine sandy loam; coarsely laminated; very friable; many fine roots; many small pores; few worm channels and casts; medium acid; abrupt wavy boundary.

C2—13 to 16 inches; dark yellowish brown (10YR 4/4) coarsely laminated loamy sand; massive; very friable; common fine roots; many small pores; few worm channels and casts; medium acid; abrupt wavy boundary.

C3—16 to 21 inches; dark yellowish brown (10YR 4/4) coarsely laminated fine sandy loam; massive; very friable; common fine roots; many small pores; thin patchy clay films bridge sand grains; medium acid; abrupt wavy boundary.

C4—21 to 60 inches; yellowish brown (10YR 5/4) coarsely laminated loamy fine sand; massive; very friable; few fine roots; many small pores; slightly acid.

The sandy sediment ranges from 60 to more than 80 inches in thickness. Reaction of the solum is medium acid or slightly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 through 4.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. It is dominantly loamy fine sand or loamy sand. Most pedons have thick layers or thin strata of fine sandy loam or very fine sandy loam. Gravel content ranges from 0 to 20 percent in the lower part of the C horizon.

Wilderness series

The Wilderness series consists of deep, moderately well drained soils that have a fragipan. Permeability is moderate above the fragipan and slow through the fragipan. These soils formed in residuum weathered from cherty limestone on uplands. Slopes range from 2 to 7 percent.

Wilderness soils are adjacent to Captina, Clarksville, and Doniphan soils. Captina soils have less chert above the fragipan and are in positions similar to those of the Wilderness soils. Clarksville and Doniphan soils do not have a fragipan. They are on the steeper side slopes adjacent to the Wilderness soils.

Typical pedon in an area of Wilderness cherty silt loam, 2 to 7 percent slopes, 1,700 feet east and 1,650 feet north of the SW corner of sec. 30, T. 25 N., R. 4 E., in Ripley County:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) cherty silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; many coarse roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; 40 percent chert fragments; strongly acid; abrupt smooth boundary.

E—4 to 8 inches; pale brown (10YR 6/3) very cherty silt loam; weak medium platy structure; very friable; many coarse roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; 50 percent chert fragments; very strongly acid; abrupt smooth boundary.

BE—8 to 13 inches; yellowish brown (10YR 5/6) very cherty silt loam; weak very fine subangular blocky structure; very friable; many coarse roots; many small pores; common worm channels and casts; common fine concretions of iron and manganese oxides; 55 percent chert fragments; very strongly acid; abrupt smooth boundary.

Bt1—13 to 17 inches; strong brown (7.5YR 5/6) very cherty silty clay loam; moderate very fine subangular blocky structure; very firm; many medium roots; many small pores; common worm channels and casts; thin patchy clay films on faces of peds; common fine concretions of iron and manganese oxides; 65 percent chert fragments; very strongly acid; abrupt smooth boundary.

Bx—17 to 28 inches; light yellowish brown (10YR 6/4) very cherty silty clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak very fine subangular blocky structure; firm in place, brittle when broken out; few medium roots in seams; many small pores; few worm channels and casts; many fine concretions of iron and manganese oxides; 50 percent chert fragments; very strongly acid; abrupt smooth boundary.

Bt2—28 to 60 inches; strong brown (7.5YR 5/6) very cherty clay; common fine prominent reddish brown (5YR 4/4) and dark red (2.5YR 3/6) mottles; strong fine subangular blocky structure; very firm; many small pores; few worm channels and casts; common small concretions of iron and manganese oxides; 50 percent chert fragments; very strongly acid.

The thickness of the solum is 60 inches or more. The depth to the fragipan ranges from 15 to 20 inches.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 4 through 6, and chroma of 3 or 4. The A and E horizons range from very strongly acid to slightly acid. Chert content ranges from 15 to 50 percent.

The Bt1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. Chert content ranges from 35 to 65 percent and increases with depth. Reaction ranges from medium acid to very strongly acid. The fragipan and underlying material are variable in color and range from 20 to 80 percent content of chert.

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glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the removal of water from the soil. Drainage classes are determined on the basis of an overall evaluation of water removal as influenced by climate, slope, and position on the landscape. Precipitation, runoff, amount of moisture infiltrating the soil, and rate of water movement through the soil affect the degree and duration of wetness. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. The soils in this class generally are free of mottles throughout. They commonly are shallow, very porous, or steep, or a combination of these.

Somewhat excessively drained.—Water is removed from the soil rapidly. The soils in this class generally are free of mottles throughout. They commonly are shallow or moderately deep, very porous, or steep, or a combination of these.

Well drained.—Water is removed from the soil so readily that the upper 40 inches generally does not have the mottles or dull colors related to wetness.

Moderately well drained.—Water is removed from the soil so slowly that the upper 20 to 40 inches has the mottles or dull colors related to wetness. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Somewhat poorly drained.—Water is removed from the soil so slowly that the upper 10 to 20 inches has the mottles or dull colors related to wetness. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Poorly drained.—Water is removed so slowly that either the soil is periodically saturated or the upper 10 inches has the mottles or dull colors related to wetness. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water is at or on the surface most of the time. The soils in this class commonly have a slowly permeable layer, have a water table, or receive runoff or seepage, or they are characterized by a combination of these.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:
O horizon. An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
E horizon.—The mineral horizon below an O or A horizon and above a B horizon. The E horizon is

characterized by a loss of some combination of silicate clay, iron, and aluminum and by a remaining concentration of sand and silt particles of quartz or other resistant minerals.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or angular or subangular blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A, E, or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

R layer.—Hard bedrock rock beneath the soil. The bedrock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, B, and E horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon below the surface layer (A, E, AB, or EB horizon).

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-79 at Poplar Bluff, Missouri]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days[1]	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	44.5	24.3	34.4	72	-1	14	3.22	1.51	4.68	6	3.3
February	48.9	28.1	38.5	72	5	21	3.31	1.80	4.64	6	2.5
March	58.6	36.5	47.6	82	15	107	5.30	2.48	7.72	8	2.2
April	71.1	47.6	59.4	88	28	290	4.45	2.37	6.27	8	.0
May	79.5	55.9	67.7	94	36	549	5.11	2.95	7.02	7	.0
June	87.3	63.9	75.6	98	48	768	3.82	1.87	5.50	6	.0
July	90.9	67.8	79.4	101	52	911	3.68	1.85	5.26	6	.0
August	89.6	65.6	77.6	101	52	856	3.27	1.33	4.90	5	.0
September	83.2	58.5	70.9	99	39	627	3.80	1.35	5.82	6	.0
October	73.3	45.6	59.5	90	27	311	2.37	.58	3.79	4	.0
November	59.0	35.9	47.5	80	13	65	4.29	2.04	6.22	5	.6
December	48.1	28.5	38.3	71	4	15	3.70	1.49	5.55	7	.9
Yearly:											
Average	69.5	46.5	58.0	---	---	---	---	---	---	---	---
Extreme	---	---	---	102	-2	---	---	---	---	---	---
Total	---	---	---	---	---	4,534	46.32	37.17	55.53	74	9.5

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-79 at Poplar Bluff, Missouri]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 5	April 7	April 19
2 years in 10 later than--	March 29	April 3	April 14
5 years in 10 later than--	March 16	March 25	April 6
First freezing temperature in fall:			
1 year in 10 earlier than--	October 29	October 23	October 13
2 years in 10 earlier than--	November 3	October 28	October 17
5 years in 10 earlier than--	November 13	November 6	October 25

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-79 at Poplar Bluff, Missouri]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	220	208	184
8 years in 10	227	214	190
5 years in 10	241	225	201
2 years in 10	255	235	212
1 year in 10	262	241	218

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Butler County	Part of Ripley County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
1	Adler silt loam	22,500	1,200	23,700	3.2
2	Amagon silt loam	41,000	924	41,924	5.7
3B	Elk silt loam, 1 to 4 percent slopes	5,250	5,700	10,950	1.5
4D	Bardley cherty silt loam, 9 to 14 percent slopes	0	1,100	1,100	0.1
5B	Bosket fine sandy loam, 2 to 5 percent slopes	15,800	5,800	21,600	2.9
5C	Bosket fine sandy loam, 5 to 9 percent slopes	2,600	302	2,902	0.4
6C2	Bosket fine sandy loam, 4 to 10 percent slopes, eroded	3,050	0	3,050	0.4
7	Calhoun silt loam, occasionally flooded	74,800	7,500	82,300	11.2
8B	Captina silt loam, 2 to 5 percent slopes	5,800	22,500	28,300	3.9
8B2	Captina silt loam, 2 to 5 percent slopes, eroded	32	4,100	4,132	0.6
8C	Captina silt loam, 5 to 9 percent slopes	39,500	14,400	53,900	7.3
8C2	Captina silt loam, 5 to 9 percent slopes, eroded	1,050	6,100	7,150	1.0
9C	Clarksville very cherty silt loam, 2 to 9 percent slopes	10,600	13,900	24,500	3.3
9D	Clarksville very cherty silt loam, 9 to 14 percent	20,000	6,900	26,900	3.7
9F	Clarksville very cherty silt loam, 14 to 35 percent slopes	52,500	3,600	56,100	7.6
10D	Clarksville stony silt loam, 5 to 14 percent slopes	123	7,400	7,523	1.0
10F	Clarksville stony silt loam, 14 to 35 percent slopes	1,550	13,600	15,150	2.1
11	Crowley silt loam	6,600	0	6,600	0.9
12C	Doniphan very cherty silt loam, 2 to 9 percent slopes	207	42,500	42,707	5.8
12D	Doniphan very cherty silt loam, 9 to 14 percent slopes	268	19,400	19,668	2.7
12F	Doniphan very cherty silt loam, 14 to 35 percent slopes	540	8,900	9,440	1.3
13D	Doniphan stony silt loam, 5 to 14 percent slopes	0	2,050	2,050	0.3
14B	Dubbs silt loam, 0 to 5 percent slopes	13,325	15	13,340	1.8
15	Foley silt loam	6,000	0	6,000	0.8
16D	Gasconade-Rock outcrop complex, 2 to 14 percent slopes	0	680	680	0.1
16F	Gasconade-Rock outcrop complex, 14 to 30 percent slopes	0	810	810	0.1
17C	Gatewood cherty silt loam, 2 to 9 percent slopes	0	3,350	3,350	0.5
18B	Hartville silt loam, 1 to 4 percent slopes	278	610	888	0.1
19	Hontas silt loam	3,350	1,700	5,050	0.7
20	Houlka silty clay loam	2,000	0	2,000	0.3
21	Kobel clay	17,100	1,500	18,600	2.5
22	Lafe silt loam	2,400	0	2,400	0.3
23B	Loring silt loam, 2 to 5 percent slopes	6,800	10,800	17,600	2.4
23B2	Loring silt loam, 2 to 5 percent slopes, eroded	760	5,600	6,360	0.9
23C	Loring silt loam, 5 to 9 percent slopes	12,000	3,450	15,450	2.1
23C2	Loring silt loam, 5 to 9 percent slopes, eroded	4,950	6,300	11,250	1.5
23D	Loring silt loam, 9 to 14 percent slopes	1,500	84	1,584	0.2
23D2	Loring silt loam, 9 to 14 percent slopes, eroded	1,150	165	1,315	0.2
24A	Midco cherty loam, 1 to 3 percent slopes	8,300	22,400	30,700	4.2
25	Nolin silt loam	3,700	3,000	6,700	0.9
26B	Peridge silt loam, 2 to 5 percent slopes	5	427	432	0.1
26C	Peridge silt loam, 5 to 9 percent slopes	53	393	446	0.1
26C2	Peridge silt loam, 5 to 9 percent slopes, eroded	12	220	232	*
27	Secesh silt loam	1,450	2,000	3,450	0.5
28	Tuckerman fine sandy loam	26,750	8,800	35,550	4.8
29B	Tuckerman-Bosket fine sandy loams, 0 to 5 percent slopes	23,750	4,300	28,050	3.8
30	Wideman fine sandy loam, 0 to 5 percent slopes	3,450	1,650	5,100	0.7
31B	Wilderness cherty silt loam, 2 to 7 percent slopes	1,600	9,800	11,400	1.6
32	Pits	75	10	85	*
33	Calhoun silt loam	13,200	0	13,200	1.8
	Water	512		512	0.1
	734,180	458,240	275,940	734,180	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name]

Map symbol	Soil name
1	Adler silt loam
2	Amagon silt loam (where drained)
3B	Elk silt loam, 1 to 4 percent slopes
5B	Bosket fine sandy loam, 2 to 5 percent slopes
7	Calhoun silt loam, occasionally flooded (where drained)
8B	Captina silt loam, 2 to 5 percent slopes
8B2	Captina silt loam, 2 to 5 percent slopes, eroded
11	Crowley silt loam (where drained)
14B	Dubbs silt loam, 0 to 5 percent slopes
18B	Hartville silt loam, 1 to 4 percent slopes
19	Hontas silt loam
20	Houlka silty clay loam (where drained)
21	Kobel clay (where drained)
23B	Loring silt loam, 2 to 5 percent slopes
23B2	Loring silt loam, 2 to 5 percent slopes, eroded
25	Nolin silt loam
26B	Peridge silt loam, 2 to 5 percent slopes
27	Secesh silt loam
28	Tuckerman fine sandy loam (where drained)
29B	Tuckerman-Bosket fine sandy loams, 0 to 5 percent slopes (where Tuckerman part is drained)
30	Wideman fine sandy loam, 0 to 5 percent slopes
33	Calhoun silt loam (where drained)

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield figure indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn		Soybeans		Grain sorghum		Winter wheat	Rice	Tall fescue
	N	I	N	I	N	I	N	I	N
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	AUM*
1---------- Adler	---	---	42	---	98	---	50	---	9.5
2---------- Amagon	---	188	30	---	68	---	33	120	7.2
3B---------- Elk	---	---	40	---	87	---	45	---	8.4
4D---------- Bardley	---	---	---	---	---	---	20	---	4.0
5B---------- Bosket	85	---	35	---	78	---	38	---	8.0
5C---------- Bosket	75	---	31	---	72	---	35	---	7.4
6C2---------- Bosket	70	---	27	---	63	---	31	---	6.8
7---------- Calhoun	---	175	25	---	56	---	28	120	6.2
8B---------- Captina	---	---	27	---	27	---	31	---	6.8
8B2, 8C---------- Captina	---	---	25	---	25	---	28	---	6.2
8C2---------- Captina	---	---	20	---	19	---	24	---	5.2
9C---------- Clarksville	---	---	---	---	---	---	18	---	4.2
9D---------- Clarksville	---	---	---	---	---	---	---	---	3.8
9F---------- Clarksville	---	---	---	---	---	---	---	---	2.6
10D. Clarksville									
10F---------- Clarksville	---	---	---	---	---	---	---	---	2.6
11---------- Crowley	---	181	25	---	---	61	30	120	6.6
12C---------- Doniphan	---	---	---	---	---	---	20	---	4.6
12D---------- Doniphan	---	---	---	---	---	---	---	---	4.2
12F---------- Doniphan	---	---	---	---	---	---	---	---	3.0
13D---------- Doniphan	---	---	---	---	---	---	---	---	3.0

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn		Soybeans		Grain sorghum		Winter wheat	Rice	Tall fescue
	N	I	N	I	N	I	N	I	N
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	AUM*
14B---------- Dubbs	---	200	35	---	78	---	40	---	8.0
15---------- Foley	---	191	30	---	69	---	34	120	7.2
16D---------- Gasconade-Rock outcrop	---	---	---	---	---	---	---	---	2.6
16F---------- Gasconade-Rock outcrop	---	---	---	---	---	---	---	---	2.6
17C---------- Gatewood	---	---	---	---	---	---	---	---	5.2
18B---------- Hartville	---	---	---	---	---	---	31	---	6.4
19---------- Hontas	---	---	42	---	98	---	45	---	10.0
20---------- Houlka	---	167	32	---	48	---	24	---	10.0
21---------- Kobel	---	170	32	---	52	---	26	120	6.4
22---------- Lafe	---	---	21	---	50	---	25	120	5.4
23B---------- Loring	---	---	30	---	67	---	33	---	7.0
23B2---------- Loring	---	---	25	---	59	---	29	---	6.4
23C---------- Loring	---	---	25	---	61	---	30	---	6.6
23C2---------- Loring	---	---	20	---	45	---	23	---	5.0
23D---------- Loring	---	---	20	---	---	---	---	---	5.2
23D2---------- Loring	---	---	---	---	---	---	---	---	4.8
24A---------- Midco	---	---	---	28	---	---	26	---	5.6
25---------- Nolin	---	---	40	---	92	---	45	---	9.4
26B---------- Peridge	---	---	32	---	74	---	40	---	7.6
26C---------- Peridge	---	---	30	---	67	---	36	---	7.2
26C2---------- Peridge	---	---	22	---	52	---	29	---	5.6
27---------- Secesh	---	---	36	---	83	---	35	---	7.2
28---------- Tuckerman	---	190	36	---	83	---	34	120	7.2

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn		Soybeans		Grain sorghum		Winter wheat	Rice	Tall fescue
	N	I	N	I	N	I	N	I	N
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	AUM*
29B---------- Tuckerman-Bosket	---	190	36	---	83	---	36	---	8.2
30---------- Wideman	---	---	---	---	---	---	---	---	3.4
31B---------- Wilderness	---	---	---	---	---	---	17	---	4.0
32**. Pits									
33---------- Calhoun	---	187	30	---	68	---	33	120	7.2

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns. (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
	Acres	Acres	Acres	Acres
I:				
Butler County----------	3,700	---	---	---
Ripley County----------	3,000	---	---	---
II:				
Butler County----------	84,858	41,730	43,128	---
Ripley County----------	73,152	39,542	33,610	---
III:				
Butler County----------	270,852	81,745	185,450	3,657
Ripley County----------	95,419	32,545	18,724	44,150
IV:				
Butler County----------	22,380	7,512	---	14,868
Ripley County----------	60,254	12,704	---	47,550
V:				
Butler County----------	---	---	---	---
Ripley County----------	---	---	---	---
VI:				
Butler County----------	21,813	1,150	---	20,663
Ripley County----------	25,415	165	---	25,250
VII:				
Butler County----------	54,050	---	---	54,050
Ripley County----------	18,690	---	---	18,690
VIII:				
Butler County----------	---	---	---	---
Ripley County----------	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
1--Adler	1o	Slight	Slight	Slight	Moderate	Green ash	95	Green ash, eastern cottonwood, sweetgum, American sycamore.
						Eastern cottonwood	120	
						Water oak	100	
						Willow oak	100	
						Sweetgum	100	
						American sycamore	115	
2--Amagon	1w	Slight	Severe	Moderate	Severe	Eastern cottonwood	100	Eastern cottonwood, cherrybark oak, Nuttall oak, Shumard oak, water oak, willow oak, sweetgum, American sycamore.
						Water oak	100	
						Willow oak	100	
						Cherrybark oak	90	
						Nuttall oak	100	
						Green ash	80	
						Sweetgum	100	
3B--Elk	2o	Slight	Slight	Slight	Severe	Northern red oak	80	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
						Yellow-poplar	90	
						Shortleaf pine	80	
						Eastern white pine	90	
4D--Bardley	5c	Slight	Slight	Severe	Slight	Post oak	45	Shortleaf pine, eastern redcedar, white oak, black oak.
5B, 5C, 6C2--Bosket	2o	Slight	Slight	Slight	Moderate	Eastern cottonwood	100	Eastern cottonwood, green ash, sweetgum, cherrybark oak, water oak, willow oak, Shumard oak, American sycamore.
						Green ash	80	
						Sweetgum	90	
						Cherrybark oak	90	
						Water oak	90	
						Willow oak	90	
7--Calhoun	3w	Slight	Severe	Moderate	Severe	Sweetgum	80	Sweetgum, loblolly pine.
						Pin oak	80	
						American sycamore	---	
						Cherrybark oak	---	
8B, 8B2, 8C, 8C2--Captina	4d	Slight	Slight	Moderate	Slight	Shortleaf pine	60	Shortleaf pine, black oak, southern red oak.
						Southern red oak	65	
						Eastern redcedar	40	
						Black locust	---	
						Black walnut	---	
9C, 9D--Clarksville	4f	Slight	Moderate	Moderate	Slight	White oak	55	White oak, shortleaf pine, yellow-poplar, green ash.
						Shortleaf pine	55	
						Black oak	---	
						Northern red oak	---	
						Scarlet oak	---	
9F--Clarksville	4f	Slight	Moderate	Moderate	Slight	White oak	55	White oak, shortleaf pine, yellow-poplar, green ash.
						Shortleaf pine	---	
10D--Clarksville	4x	Slight	Moderate	Moderate	Slight	White oak	55	White oak, shortleaf pine, yellow-poplar, green ash.
						Shortleaf pine	---	
10F--Clarksville	4x	Slight	Moderate	Moderate	Slight	White oak	55	White oak, shortleaf pine, yellow-poplar, green ash.
						Shortleaf pine	---	
11--Crowley	3o	Slight	Slight	Slight	Slight	Loblolly pine	83	Loblolly pine, eastern white pine, white oak, sweetgum.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
12C, 12D---------- Doniphan	4f	Slight	Moderate	Slight	Slight	White oak---------- Shortleaf pine------	65 60	Shortleaf pine, white oak, yellow-poplar, green ash, black oak.
12F---------- Doniphan	4f	Moderate	Moderate	Moderate	Slight	White oak---------- Shortleaf pine------	65 60	Shortleaf pine, white oak, yellow-poplar, green ash, black oak, sugar maple.
13D---------- Doniphan	4x	Slight	Moderate	Slight	Slight	White oak---------- Shortleaf pine------	65 60	Shortleaf pine, white oak, sweetgum, yellow-poplar, green ash, black oak, shagbark hickory, sugar maple.
14B---------- Dubbs	2o	Slight	Slight	Slight	Moderate	Cherrybark oak------ Eastern cottonwood-- Green ash---------- Nuttall oak--------- Shumard oak--------- Sweetgum---------- Water oak---------- Willow oak----------	100 100 80 95 100 95 90 95	Eastern cottonwood, green ash, Nuttall oak, sweetgum, American sycamore, yellow-poplar.
15---------- Foley	3w	Slight	Severe	Moderate	Severe	Sweetgum---------- Cherrybark oak------ Water oak---------- Loblolly pine-------	80 80 80 60	Sweetgum, American sycamore, loblolly pine.
16D*: Gasconade--------- Rock outcrop.	5d	Slight	Moderate	Moderate	Slight	Eastern redcedar---- Chinkapin oak------- White ash---------- Sugar maple--------- Mockernut hickory--- Post oak---------- Blackjack oak-------	30 --- --- --- --- --- ---	Eastern redcedar, shortleaf pine.
16F*: Gasconade--------- Rock outcrop.	5d	Slight	Severe	Moderate	Slight	Eastern redcedar---- Chinkapin oak------- White ash---------- Sugar maple--------- Mockernut hickory--- Post oak---------- Blackjack oak-------	30 --- --- --- --- --- ---	Eastern redcedar, shortleaf pine.
17C---------- Gatewood	5c	Slight	Slight	Severe	Slight	White oak---------- Eastern redcedar---- Post oak---------- Black oak----------	45 --- --- ---	Eastern redcedar, shortleaf pine.
18B---------- Hartville	5c	Slight	Slight	Severe	Slight	White oak----------	55	Eastern cottonwood, yellow-poplar, white oak, pin oak.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
19---------- Hontas	2o	Slight	Slight	Slight	Moderate	Shortleaf pine------	80	Shortleaf pine, black walnut, loblolly pine, eastern cottonwood, American sycamore, Shumard oak, sweetgum.
						Shumard oak---------	80	
						Sweetgum------------	80	
						Eastern cottonwood--	80	
						American sycamore---	75	
						Black walnut--------	---	
						Water oak-----------	---	
20---------- Houlka	1c	Slight	Moderate	Severe	Moderate	Sweetgum------------	105	Sweetgum, eastern cottonwood, cherrybark oak, American sycamore, green ash, Nuttall oak.
						Green ash-----------	85	
						Eastern cottonwood--	105	
						Cherrybark oak------	105	
						Nuttall oak---------	105	
						Shumard oak---------	105	
						American sycamore---	100	
21---------- Kobel	3w	Slight	Severe	Severe	Severe	Green ash-----------	75	Eastern cottonwood, sweetgum.
						Eastern cottonwood--	90	
						Water oak-----------	80	
						Water hickory-------	---	
23B, 23B2, 23C, 23C2, 23D, 23D2--- Loring	3o	Slight	Slight	Slight	Slight	White oak-----------	62	Shortleaf pine, yellow-poplar, black oak, white oak.
						Black oak-----------	66	
						Shortleaf pine------	62	
24A---------- Midco	4f	Slight	Slight	Moderate	Slight	White oak-----------	55	White oak, shortleaf pine.
						American sycamore---	---	
						Shortleaf pine------	---	
						Black oak-----------	60	
25---------- Nolin	1o	Slight	Slight	Slight	Severe	Sweetgum------------	85	Sweetgum, yellow-poplar, eastern white pine, eastern cottonwood, white ash, cherrybark oak.
						Yellow-poplar-------	---	
26B, 26C, 26C2----- Peridge	3o	Slight	Slight	Slight	Slight	Shortleaf pine------	70	Shortleaf pine, loblolly pine, black walnut, southern red oak, white ash.
						Northern red oak----	70	
						Black walnut--------	---	
						White oak-----------	66	
						White ash-----------	---	
						Black cherry--------	---	
						Black locust--------	---	
27---------- Secesh	4o	Slight	Slight	Slight	Slight	White oak-----------	60	Shortleaf pine, American sycamore.
						Shortleaf pine------	---	
						American sycamore---	---	
						Black walnut--------	---	
						Black oak-----------	---	
28---------- Tuckerman	1w	Slight	Severe	Moderate	Severe	Green ash-----------	80	Green ash, eastern cottonwood, sweetgum, pecan, American sycamore, cherrybark oak, Nuttall oak, water oak, willow oak.
						Eastern cottonwood--	100	
						Cherrybark oak------	95	
						Nuttall oak---------	95	
						Water oak-----------	95	
						Willow oak----------	95	
						Sweetgum------------	88	
29B:								
Tuckerman---------	1w	Slight	Severe	Moderate	Severe	Green ash-----------	80	Green ash, eastern cottonwood, sweetgum, pecan, American sycamore, cherrybark oak, Nuttall oak, water oak, willow oak.
						Eastern cottonwood--	100	
						Cherrybark oak------	95	
						Nuttall oak---------	95	
						Water oak-----------	95	
						Willow oak----------	95	
						Sweetgum------------	88	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
29B:								
Bosket	2o	Slight	Slight	Slight	Moderate	Eastern cottonwood	100	Eastern cottonwood, green ash, sweetgum, cherrybark oak, water oak, Shumard oak, American sycamore.
						Green ash	80	
						Sweetgum	90	
						Cherrybark oak	90	
						Water oak	90	
						Willow oak	90	
30 Wideman	3s	Slight	Slight	Severe	Slight	Sweetgum	80	Eastern cottonwood, American sycamore, loblolly pine, shortleaf pine, sweetgum.
						Eastern cottonwood	90	
						American sycamore	80	
31B Wilderness	4d	Slight	Slight	Moderate	Slight	White oak	55	White oak, shortleaf pine, black oak.
						Black oak	65	
						Shortleaf pine	60	
33 Calhoun	3w	Slight	Severe	Moderate	Severe	Sweetgum	80	Sweetgum, Loblolly pine.
						Pin oak	80	
						American sycamore	---	
						Cherrybark oak	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
1---- Adler	Silky dogwood----	American plum, Amur honeysuckle, Tatarian honeysuckle.	Amur maple, eastern redcedar, oriental arborvitae.	American sycamore, eastern white pine, green ash, silver maple.	Eastern cottonwood.
2---- Amagon	---	Amur maple, Amur honeysuckle, arrowwood, blackhaw.	Eastern redcedar, oriental arborvitae, osageorange.	Baldcypress, black willow, hackberry, green ash, loblolly pine.	Eastern cottonwood, pin oak, silver maple.
3B---- Elk	---	Amur honeysuckle, Amur maple, autumn-olive, blackhaw, Tatarian honeysuckle.	Eastern redcedar, Virginia pine, oriental arborvitae, Manchurian crabapple.	Baldcypress, eastern white pine, Norway spruce, hackberry, green ash, osageorange, pin oak.	---
4D---- Bardley	Siberian peashrub	Radiant crabapple, eastern redcedar, Washington hawthorn, autumn-olive, lilac, Tatarian honeysuckle, Amur honeysuckle.	Austrian pine, red pine, jack pine, eastern white pine.	---	---
5B, 5C, 6C2---- Bosket	Autumn-olive----	American plum, Amur honeysuckle.	Amur maple, eastern redcedar, Virginia pine.	Eastern white pine, green ash, Norway spruce.	European alder, silver maple.
7---- Calhoun	---	Amur maple, Amur honeysuckle, arrowwood, blackhaw.	Eastern redcedar, oriental arborvitae, osageorange.	Baldcypress, black willow, hackberry, green ash, loblolly pine.	Eastern cottonwood, pin oak, silver maple.
8B, 8B2, 8C, 8C2-- Captina	Lilac----	Amur honeysuckle, Amur maple, autumn-olive.	Eastern redcedar, black locust, Chinese elm, green ash, Manchurian crabapple.	Loblolly pine, eastern white pine, pin oak.	---
9C, 9D, 9F, 10D, 10F---- Clarksville	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Tatarian honeysuckle, Amur honeysuckle, lilac.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
11---- Crowley	Lilac----	Amur honeysuckle, Amur maple, autumn-olive.	Eastern redcedar, black locust, Chinese elm, green ash, Manchurian crabapple.	Loblolly pine, eastern white pine, pin oak.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
12C, 12D, 12F----- Doniphan	Amur honeysuckle, lilac, fragrant sumac.	Autumn-olive------	Austrian pine, honeylocust, eastern redcedar, hackberry, green ash, bur oak, Russian-olive.	Siberian elm------	---
13D---------- Doniphan	Lilac, Amur honeysuckle, fragrant sumac.	Autumn-oive-------	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian-olive.	Siberian elm------	---
14B---------- Dubbs	Silky dogwood-----	American plum, Amur honeysuckle, Tatarian honeysuckle.	Amur maple, eastern redcedar, oriental arborvitae.	American sycamore, eastern white pine, green ash.	Eastern cottonwood, silver maple.
15---------- Foley	---	Eastern redcedar, green ash.	---	---	---
16D*, 16F*: Gasconade.					
Rock outcrop.					
17C---------- Gatewood	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
18B---------- Hartville	Lilac----------	Amur honeysuckle, Amur maple, autumn-olive, Manchurian crabapple.	Austrian pine, hackberry, green ash, jack pine, Russian-olive, eastern redcedar.	Honeylocust-------	---
19---------- Hontas	---	Autumn-olive, blackhaw, Tatarian honeysuckle.	Eastern redcedar, Washington hawthorn, osage-orange.	Bur oak, hackberry, green ash, honey locust.	Eastern cottonwood.
20---------- Houlka	---	Amur honeysuckle, Amur maple, autumn-olive, blackhaw.	Eastern redcedar, Virginia pine.	Green ash, baldcypress.	Eastern white pine, eastern cottonwood, pin oak, loblolly pine.
21---------- Kobel	---	Blackhaw, Washington hawthorn, Tatarian honeysuckle.	Eastern redcedar, hackberry, osage-orange.	Black willow, bur oak, green ash, honey locust, golden willow.	Eastern cottonwood.
22---------- Lafe	---	Eastern redcedar, green ash.	---	---	---
23B, 23B2, 23C, 23C2, 23D, 23D2-- Loring	Lilac----------	Manchurian crabapple, Amur honeysuckle, Amur maple, autumn-olive.	Eastern redcedar, Austrian pine, hackberry, green ash, Russian-olive.	Honeylocust, jack pine.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
24A---------- Midco	---	Autumn-olive, Amur honeysuckle, Amur maple, lilac.	Eastern redcedar	Austrian pine, honeylocust, pin oak, eastern white pine, hackberry, green ash.	Eastern cottonwood.
25---------- Nolin	---	Autumn-olive, blackhaw, Tatarian honeysuckle.	Eastern redcedar, Washington hawthorn, osage-orange.	Bur oak, hackberry, green ash, honeylocust.	Eastern cottonwood.
26B, 26C, 26C2---- Peridge	---	Lilac, Amur honeysuckle, autumn-olive, Amur maple.	Eastern redcedar, hackberry, Russian-olive.	Norway spruce, eastern white pine, honeylocust, green ash, pin oak.	---
27---------- Secesh	---	Autumn-olive, Amur honeysuckle, Amur maple, lilac.	Eastern redcedar	Austrian pine, honeylocust, radiant crabapple, eastern white pine, hackberry, green ash.	Eastern cottonwood.
28---------- Tuckerman	---	Amur maple, Amur honeysuckle, arrowweed, blackhaw.	Eastern redcedar, oriental arborvitae, osageorange.	Baldcypress, black willow, hackberry, green ash, loblolly pine.	Eastern cottonwood, pin oak, silver maple.
29B---------- Tuckerman	---	Amur maple, Amur honeysuckle, arrowweed, blackhaw.	Eastern redcedar, oriental arborvitae, osageorange.	Baldcypress, black willow, hackberry, green ash, loblolly pine.	Eastern cottonwood, pin oak, silver maple.
Bosket----------	Autumn-olive------	American plum, Amur honeysuckle.	Amur maple, eastern redcedar, Virginia pine.	Eastern white pine, green ash, Norway spruce.	European alder, silver maple.
30---------- Wideman	---	Amur honeysuckle, Amur maple, autumn-olive, blackhaw.	Eastern redcedar, Virginia pine.	Green ash, baldcypress.	Eastern white pine, eastern cottonwood, pin oak, loblolly pine.
31B---------- Wilderness	Amur honeysuckle, lilac, fragrant sumac.	Autumn-olive------	Honeylocust, Austrian pine, hackberry, eastern redcedar, green ash, bur oak, Russian-olive.	Siberian elm------	---
32*. Pits					
33---------- Calhoun	---	Amur maple, Amur honeysuckle, arrowweed, blackhaw.	Eastern redcedar, oriental arborvitae, osageorange.	Baldcypress, black willow, hackberry, green ash, loblolly pine.	Eastern cottonwood, pin oak, pin oak, silver maple.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Adler	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
2 Amagon	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
3B Elk	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
4D Bardley	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
5B Bosket	Slight	Slight	Moderate: slope.	Slight	Slight.
5C, 6C2 Bosket	Slight	Slight	Severe: slope.	Slight	Slight.
7 Calhoun	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
8B, 8B2 Captina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
8C Captina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
8C2 Captina	Moderate: wetness, percs slowly, slope.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
9C Clarksville	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
9D Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
9F Clarksville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
10D Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
10F Clarksville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
11 Crowley	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
12C Doniphan	Severe: small stones.	Severe: small stones.	Severe: small stones.	Moderate: large stones.	Severe: small stones.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
12D---------- Doniphan	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones.
12F---------- Doniphan	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: large stones, slope.	Severe: small stones, slope.
13D---------- Doniphan	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: large stones.	Severe: small stones, large stones.
14B---------- Dubbs	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
15---------- Foley	Severe: wetness, percs slowly.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: wetness.	Severe: excess sodium, wetness.
16D*: Gasconade----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Severe: large stones.	Severe: large stones, thin layer.
Rock outcrop.					
16F*: Gasconade----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: large stones.	Severe: large stones, slope, thin layer.
Rock outcrop.					
17C---------- Gatewood	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight----------	Severe: small stones.
18B---------- Hartville	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, flooding.	Severe: erodes easily.	Moderate: wetness, flooding.
19---------- Hontas	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Severe: erodes easily.	Moderate: flooding.
20---------- Houlka	Severe: flooding, wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
21---------- Kobel	Severe: flooding, wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
22---------- Lafe	Severe: wetness, percs slowly, excess sodium.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: wetness, erodes easily.	Severe: excess sodium, wetness.
23B, 23B2---------- Loring	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
23C, 23C2---------- Loring	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Slight----------	Slight.
23D, 23D2---------- Loring	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
24A---------- Midco	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight----------	Severe: droughty.
25---------- Nolin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
26B---------- Peridge	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
26C, 26C2---------- Peridge	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
27---------- Secesh	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight----------	Moderate: large stones, flooding.
28---------- Tuckerman	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
29B:					
Tuckerman----------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Bosket----------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
30---------- Wideman	Severe: flooding.	Slight----------	Severe: flooding, too sandy.	Slight----------	Moderate: flooding.
31B---------- Wilderness	Severe: wetness.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness.	Severe: droughty.
32*. Pits					
33---------- Calhoun	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe wetness, erodes easily.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1---------- Adler	Good	Good	Good	Good	Fair	Poor	Poor	Good	Good	Poor.
2---------- Amagon	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
3B---------- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4D---------- Bardley	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
5B---------- Bosket	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
5C, 6C2---------- Bosket	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7---------- Calhoun	Poor	Fair	Fair	Good	---	Good	Good	Fair	Fair	Good.
8B---------- Captina	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
8B2---------- Captina	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8C, 8C2---------- Captina	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
9C, 9D, 9F, 10D, 10F---------- Clarksville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
11---------- Crowley	Fair	Fair	Fair	Fair	---	Fair	Fair	Fair	Fair	Fair.
12C, 12D---------- Doniphan	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
12F---------- Doniphan	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
13D---------- Doniphan	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
14B---------- Dubbs	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
15---------- Foley	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
16D*, 16F*: Gasconade----------	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
17C---------- Gatewood	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
18B---------- Hartville	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
19---------- Hontas	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
20---------- Houlka	Good	Good	Fair	Good	---	Fair	Good	Good	Good	Fair.
21---------- Kobel	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
22---------- Lafe	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Good	Very poor.	Poor	Fair.
23B, 23B2---------- Loring	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
23C, 23C2, 23D, 23D2---------- Loring	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24A---------- Midco	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
25---------- Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
26B---------- Peridge	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
26C, 26C2---------- Peridge	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
27---------- Secesh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
28---------- Tuckerman	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair.
29B: Tuckerman---------	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair.
Bosket----------	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
30---------- Wideman	Fair	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
31B---------- Wilderness	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
32*. Pits										
33---------- Calhoun	Poor	Fair	Fair	Good	---	Good	Good	Fair	Fair	Good

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1---------- Adler	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
2---------- Amagon	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Moderate: wetness, flooding.
3B---------- Elk	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
4D---------- Bardley	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: small stones.
5B---------- Bosket	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
5C, 6C2---------- Bosket	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
7---------- Calhoun	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
8B, 8B2---------- Captina	Moderate: too clayey, wetness.	Moderate: wetness.	Severe: shrink-swell, wetness.	Moderate: wetness.	Severe: low strength.	Slight.
8C---------- Captina	Moderate: too clayey, wetness.	Moderate: wetness.	Severe: shrink-swell, wetness.	Moderate: slope, wetness.	Severe: low strength.	Slight.
8C2---------- Captina	Moderate: too clayey, wetness, slope.	Moderate: slope, wetness.	Severe: shrink-swell, wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
9C---------- Clarksville	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: small stones.
9D---------- Clarksville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
9F---------- Clarksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
10D---------- Clarksville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
10F---------- Clarksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
11---------- Crowley	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
12C---------- Doniphan	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Severe: small stones.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12D---------- Doniphan	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Severe: small stones.
12F---------- Doniphan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: small stones, slope.
13D---------- Doniphan	Moderate: too clayey, large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Severe: low strength.	Severe: small stones, large stones.
14B---------- Dubbs	Slight---------	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
15---------- Foley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: excess sodium, wetness.
16D*: Gasconade--------	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: large stones, thin layer.
Rock outcrop.						
16F*: Gasconade--------	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, slope, thin layer.
Rock outcrop.						
17C---------- Gatewood	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: small stones.
18B---------- Hartville	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
19---------- Hontas	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
20---------- Houlka	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: too clayey.
21---------- Kobel	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	
22---------- Lafe	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: excess sodium, wetness.
23B, 23B2--------- Loring	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Slight.
23C, 23C2--------- Loring	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
23D, 23D2--------- Loring	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
24A--------- Midco	Moderate: large stones, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
25--------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
26B--------- Peridge	Moderate: too clayey.	Slight---------	Slight---------	Slight---------	Severe: low strength.	Slight.
26C, 26C2--------- Peridge	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
27--------- Secesh	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: large stones, flooding.
28--------- Tuckerman	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
29B: Tuckerman---------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
Bosket----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
30--------- Wideman	Severe: flooding, cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
31B--------- Wilderness	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Severe: droughty.
32*. Pits						
33--------- Calhoun	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Adler	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
2 Amagon	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3B Elk	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
4D Bardley	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
5B Bosket	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
5C, 6C2 Bosket	Slight	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Good.
7 Calhoun	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
8B, 8B2 Captina	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
8C Captina	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
8C2 Captina	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
9C Clarksville	Slight	Severe: seepage.	Severe: seepage, too clayey.	Severe: seepage.	Poor: too clayey, small stones.
9D Clarksville	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Severe: seepage.	Poor: too clayey, small stones.
9F Clarksville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, small stones, slope.
10D Clarksville	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Severe: seepage.	Poor: too clayey, small stones.
10F Clarksville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, small stones, slope.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11---------- Crowley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
12C---------- Doniphan	Moderate: percs slowly.	Moderate: seepage, slope, large stones.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
12D---------- Doniphan	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
12F---------- Doniphan	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, hard to pack, slope.
13D---------- Doniphan	Moderate: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
14B---------- Dubbs	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
15---------- Foley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: hard to pack, wetness, excess sodium.
16D*: Gasconade----------	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, large stones.
Rock outcrop.					
16F*: Gasconade----------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, large stones.
Rock outcrop.					
17C---------- Gatewood	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
18B---------- Hartville	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
19---------- Hontas	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
20---------- Houlka	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21--Kobel	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
22--Lafe	Severe: wetness, percs slowly.	Slight	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
23B, 23B2--Loring	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
23C, 23C2--Loring	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
23D, 23D2--Loring	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: slope, wetness.
24--Midco	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: seepage, small stones.
25--Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
26B--Peridge	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
26C, 26C2--Peridge	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
27--Secesh	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones.
28--Tuckerman	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
29B:					
Tuckerman	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
Bosket	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
30--Wideman	Severe: flooding.	Severe: flooding, seepage.	Severe: seepage, flooding.	Severe: flooding, seepage.	Poor: seepage.
31B--Wilderness	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, small stones.
32*. Pits					
33--Calhoun	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1---------- Adler	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
2---------- Amagon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
3B---------- Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
4D---------- Bardley	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
5B, 5C, 6C2---------- Bosket	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
7---------- Calhoun	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
8B, 8B2, 8C, 8C2------ Captina	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
9C, 9D---------- Clarksville	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
9F---------- Clarksville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
10D---------- Clarksville	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
10F---------- Clarksville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
11---------- Crowley	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
12C, 12D---------- Doniphan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
12F---------- Doniphan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
13D---------- Doniphan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
14B---------- Dubbs	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
15---------- Foley	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16D*, 16F*:				
Gasconade	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, large stones.
Rock outcrop.				
17C Gatewood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
18B Hartville	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, thin layer.
19 Hontas	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
20 Houlka	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
21 Kobel	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
22 Lafe	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
23B, 23B2, 23C, 23C2 Loring	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
23D, 23D2 Loring	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
24A Midco	Fair: large stones.	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
25 Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
26B, 26C, 26C2 Peridge	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
27 Secesh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
28 Tuckerman	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
29B:				
Tuckerman	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Bosket	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
30 Wideman	Good	Improbable: thin layer.	Improbable: too sandy.	Good.
31B Wilderness	Fair: large stones, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
32*. Pits				
33---------- Calhoun	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1---------- Adler	Moderate: seepage.	Severe: piping.	Flooding-------	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.
2---------- Amagon	Slight---------	Moderate: piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly, flooding.	Erodes easily	Wetness, percs slowly.
3B---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
4D---------- Bardley	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Slope, droughty.
5B---------- Bosket	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
5C, 6C2---------- Bosket	Severe: seepage.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
7---------- Calhoun	Slight---------	Severe: piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly, flooding.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
8B---------- Captina	Slight---------	Moderate: hard to pack, wetness.	Percs slowly---	Wetness, percs slowly, rooting depth.	Rooting depth, wetness, erodes easily.	Erodes easily, rooting depth, percs slowly.
8B2, 8C---------- Captina	Slight---------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Rooting depth, wetness, erodes easily.	Erodes easily, rooting depth, percs slowly.
8C2---------- Captina	Slight---------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Slope, rooting depth, erodes easily.	Slope, erodes easily, rooting depth.
9C---------- Clarksville	Severe: seepage.	Moderate: large stones.	Deep to water	Droughty, slope.	Large stones---	Large stones, droughty.
9D, 9F, 10D, 10F-- Clarksville	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
11---------- Crowley	Slight---------	Severe: wetness.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
12C---------- Doniphan	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Droughty, slope.	Favorable------	Droughty.
12D, 12F---------- Doniphan	Severe: slope.	Moderate: hard to pack.	Deep to water	Droughty, slope.	Slope----------	Slope, droughty.
13D---------- Doniphan	Severe: slope.	Severe: hard to pack.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
14B---------- Dubbs	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
15---------- Foley	Slight---------	Severe: wetness, excess sodium.	Percs slowly, excess sodium.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
16D*, 16F*: Gasconade	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
17C---------- Gatewood	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Droughty, percs slowly, depth to rock.	Large stones, depth to rock.	Large stones.
18B---------- Hartville	Slight---------	Moderate: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly. flooding.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
19---------- Hontas	Moderate: seepage.	Severe: piping.	Flooding-------	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.
20---------- Houlka	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
21---------- Kobel	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
22---------- Lafe	Slight---------	Severe: wetness, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
23B, 23B2, 23C, 23C2---------- Loring	Moderate: seepage.	Moderate: piping.	Slope----------	Wetness, rooting depth, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
23D, 23D2--------- Loring	Moderate: seepage.	Moderate: piping.	Slope----------	Wetness, rooting depth, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
24A---------- Midco	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Large stones---	Large stones, droughty.
25---------- Nolin	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
26B---------- Peridge	Moderate: seepage.	Moderate: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
26C, 26C2--------- Peridge	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
27---------- Secesh	Severe: seepage.	Slight---------	Deep to water	Favorable------	Large stones---	Favorable.
28---------- Tuckerman	Moderate: seepage.	Severe: piping, wetness.	Flooding-------	Wetness, flooding.	Wetness--------	Wetness.
29B: Tuckerman--------	Moderate: seepage.	Severe: piping, wetness.	Flooding-------	Wetness, flooding.	Wetness--------	Wetness.
Bosket----------	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
30---------- Wideman	Severe: seepage.	Severe: piping, seepage.	Deep to water	Flooding, fast intake.	Too sandy------	Droughty.
31B---------- Wilderness	Moderate: slope.	Moderate: large stones, wetness.	Percs slowly, large stones, slope.	Large stones, wetness, droughty.	Large stones, wetness.	Large stones, wetness.
32*. Pits						
33---------- Calhoun	Slight---------	Severe: piping, wetness.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1---------- Adler	0-11	Silt loam--------	ML, CL-ML	A-4	0	100	100	100	95-100	<28	NP-7
	11-60	Silt loam, silt, very fine sandy loam.	ML, CL, CL-ML	A-4	0	100	100	95-100	60-95	<30	NP-10
2---------- Amagon	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	85-100	85-100	<30	NP-10
	7-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	85-100	85-100	30-45	11-22
3B---------- Elk	0-19	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	19-60	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
4D---------- Bardley	0-8	Cherty silt loam, very cherty silt loam.	GC, CL, SC, CL-ML	A-6, A-4	0-15	60-90	50-80	50-70	45-65	25-35	5-15
	8-27	Silty clay, clay, cherty clay.	MH, GM, SM	A-7	0-10	70-95	50-95	50-90	40-85	50-70	20-35
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5B, 5C---------- Bosket	0-16	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
	16-48	Sandy clay loam, clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	100	85-100	30-70	25-40	5-17
	48-60	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
6C2---------- Bosket	0-6	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
	6-53	Sandy clay loam, clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	100	85-100	30-70	25-40	5-17
	53-60	Fine sandy loam, loamy sand.	SM	A-2, A-4	0	100	100	65-100	15-45	<20	NP-3
7---------- Calhoun	0-16	Silt loam--------	CL-ML, ML, CL	A-4	0	100	100	100	95-100	<31	NP-10
	16-60	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	95-100	95-100	30-45	11-24
8B---------- Captina	0-8	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-100	75-95	<25	NP-7
	8-28	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	80-90	20-40	5-20
	28-45	Very cherty silty clay loam, very cherty silty clay.	CL, GC, SC	A-6, A-7	5-45	60-95	55-90	45-90	40-85	30-50	15-30
	45-60	Clay, silty clay, cherty clay.	CL, CH	A-6, A-7	0-10	90-100	85-95	80-95	75-90	30-55	15-30

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
8B2---------- Captina	0-4	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-100	75-95	<25	NP-7
	4-25	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	80-90	20-40	5-20
	25-31	Very cherty silty clay loam, very cherty silty clay.	CL, GC, SC	A-6, A-7	5-45	60-95	55-90	45-90	40-85	30-50	15-30
	31-60	Clay, silty clay, cherty clay.	CL, CH	A-6, A-7	0-10	90-100	85-95	80-95	75-90	30-55	15-30
8C---------- Captina	0-8	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-100	75-95	<25	NP-7
	8-28	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	80-90	20-40	5-20
	28-45	Very cherty silty clay loam, very cherty silty clay.	CL, GC, SC	A-6, A-7	5-45	60-95	55-90	45-90	40-85	30-50	15-30
	45-60	Clay, silty clay, cherty clay.	CL, CH	A-6, A-7	0-10	90-100	85-95	80-95	75-90	30-55	15-30
8C2---------- Captina	0-4	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-100	75-95	<25	NP-7
	4-25	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	80-90	20-40	5-20
	25-31	Very cherty silty clay loam, very cherty silty clay.	CL, GC, SC	A-6, A-7	5-45	60-95	55-90	45-90	40-85	30-50	15-30
	31-60	Clay, silty clay, cherty clay.	CL, CH	A-6, A-7	0-10	90-100	85-95	80-95	75-90	30-55	15-30
9C, 9D, 9F------- Clarksville	0-13	Very cherty silt loam.	GC, SC, SM-SC, GP-GC	A-2-4, A-2-6, A-1-A	5-20	30-70	10-60	5-50	5-35	20-40	5-15
	13-43	Very cherty silty clay loam, very cherty silty clay.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	5-20	30-70	10-60	10-50	5-45	30-40	15-25
	43-60	Very cherty silty clay, very cherty clay.	GC, SC, GP-GC, SP-SC	A-2-7, A-7	5-20	30-70	10-60	10-50	10-45	55-75	35-55
10D, 10F--------- Clarksville	0-13	Stony silt loam, very cherty silt loam.	GC, SC, SM-SC, SP-SC	A-1, A-2-4, A-2-6	20-30	30-70	10-60	5-50	5-35	20-40	5-15
	13-34	Very cherty silty clay loam, very cherty silty clay.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	5-20	30-70	10-60	10-50	5-45	30-40	15-25
	34-60	Very cherty silty clay, clay, very cherty clay.	GC, SC, GP-GC, SP-SC	A-2-7, A-7	5-20	30-70	10-60	10-50	10-45	55-75	35-55
11---------- Crowley	0-8	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	95-100	80-100	<30	NP-10
	8-45	Silty clay, silty clay loam.	CH, CL	A-7-6	0	100	100	95-100	85-100	41-60	20-35
	45-60	Silty clay loam, silty clay.	CL, CH	A-7-6, A-6	0	100	100	95-100	85-100	38-60	18-35
12C, 12D, 12F---- Doniphan	0-12	Very cherty silt loam.	CL-ML, GM, GM-GC, SM-SC	A-4	5-30	50-80	45-70	45-65	35-60	20-30	2-8
	12-16	Cherty silty clay loam.	CL	A-6	5-30	85-100	85-100	70-85	50-70	30-40	15-25
	16-27	Cherty clay, clay	CH, MH	A-7	0-5	85-100	60-100	55-100	50-90	51-70	25-35
	27-77	Clay----------	CH, MH	A-7	0-5	90-100	90-100	85-100	70-95	51-70	25-35
13D---------- Doniphan	0-9	Stony silt loam, very cherty silt loam.	GM, GM-GC, GC	A-2, A-4	30-70	40-70	40-70	35-60	30-50	20-30	2-8
	9-60	Clay----------	CH, MH	A-7	0-5	90-100	90-100	85-100	70-95	51-70	25-35

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
14B---------- Dubbs	0-19	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	60-90	20-35	3-10
	19-60	Loam, silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	85-95	55-90	20-35	3-14
15---------- Foley	0-8	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0	100	100	95-100	70-100	25-45	5-20
	8-13	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-49	11-25
	13-60	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	18-32
16D*:											
Gasconade-------	0-4	Flaggy silty clay loam.	CL	A-6	20-70	75-90	70-85	60-75	55-65	30-40	15-25
	4-8	Flaggy silty clay, flaggy clay, very flaggy silty clay.	GC	A-2-7	20-70	45-55	40-50	30-40	20-35	55-65	35-45
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
16F*:											
Gasconade-------	0-6	Flaggy silty clay loam.	CL	A-6	20-70	75-90	70-85	60-75	55-65	30-40	15-25
	6-16	Flaggy silty clay, flaggy clay, very flaggy silty clay.	GC	A-2-7	20-70	45-55	40-50	30-40	20-35	55-65	35-45
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
17C---------- Gatewood	0-5	Cherty silt loam, silt loam.	CL, SC, SP-SC	A-4, A-6, A-2	10-30	70-90	20-75	15-70	10-65	25-35	7-15
	5-29	Cherty silty clay, cherty clay, clay.	CH, SC	A-7	5-15	80-95	50-90	40-85	40-85	55-75	30-45
	29-36	Cherty silty clay, cherty clay, clay.	CH, SC	A-7	15-30	75-90	50-85	40-80	40-65	55-75	30-45
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
18B---------- Hartville	0-10	Silt loam--------	ML, CL	A-4, A-6	0-5	95-100	95-100	80-95	70-90	30-40	7-15
	10-26	Silt loam, silty clay loam.	CL	A-6, A-7	0-10	95-100	95-100	90-98	85-95	35-45	20-25
	26-60	Silty clay, clay, silty clay loam.	CH	A-7	0-10	95-100	95-100	90-98	85-95	50-60	30-40
19---------- Hontas	0-16	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	80-90	<25	NP-7
	16-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-95	20-35	5-15
20---------- Houlka	0-12	Silty clay loam--	CH, CL	A-7	0	100	100	90-100	75-95	45-70	32-45
	12-60	Clay, silty clay, clay loam.	CH	A-7	0	100	100	95-100	80-97	52-75	30-50
21---------- Kobel	0-8	Clay-------------	CL	A-6, A-7	0	100	100	90-100	70-90	35-45	15-25
	8-60	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-95	45-75	25-50

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22---------- Lafe	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	95-100	90-100	<30	NP-10
	5-60	Silt loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	100	95-100	90-100	25-45	8-25
23B---------- Loring	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	6-33	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	33-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
23B2---------- Loring	0-4	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	4-27	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	27-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
23C---------- Loring	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	6-33	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	33-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
23C2---------- Loring	0-3	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	3-15	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	15-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
23D---------- Loring	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	6-33	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	33-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
23D2---------- Loring	0-3	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	3-22	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	8-20
	22-60	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-22
24A---------- Midco	0-9	Cherty loam------	SM, SM-SC, GM, GM-GC	A-4, A-2-4	5-20	60-80	55-75	40-70	30-49	<25	2-7
	9-38	Gravelly loam, very cherty loam, very cherty sandy loam.	SM, SM-SC, GM, GM-GC	A-2-4, A-1-B	5-25	35-70	30-65	30-60	20-35	<25	2-7
	38-60	Very cherty loam, very cherty sandy loam, very gravelly loam.	GM, GP-GM	A-1	5-30	15-40	10-35	10-30	5-20	<20	NP-4
25---------- Nolin	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	7-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
26B, 26C---------- Peridge	0-8	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-90	80-85	<20	NP-5
	8-60	Silty clay loam, silt loam.	CL	A-6	0	95-100	90-100	85-95	80-95	30-40	11-20

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
26C2---------- Peridge	0-5	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-90	80-85	<20	NP-5
	5-60	Silty clay loam, silt loam.	CL	A-6	0	95-100	90-100	85-95	80-95	30-40	11-20
27---------- Secesh	0-8	Silt loam--------	ML	A-4	0-10	85-100	80-100	75-95	60-90	20-30	NP-7
	8-22	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-10	80-100	75-100	70-95	60-90	25-35	5-12
	22-60	Very cherty sandy clay loam, very cherty clay loam, cherty sandy clay.	GC, SC, GP-GC, SP-SC	A-6, A-2-6	15-45	40-70	25-65	20-45	10-40	30-40	11-20
28---------- Tuckerman	0-13	Fine sandy loam	ML, SM	A-4	0	100	100	85-95	30-65	<20	NP-3
	13-19	Fine sandy loam, loam.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	85-95	40-65	<25	NP-5
	19-49	Sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	100	85-95	40-70	20-35	5-15
	49-60	Fine sandy loam, loam.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	85-95	40-65	<25	NP-5
29B:											
Tuckerman-------	0-13	Fine sandy loam	ML, SM	A-4	0	100	100	85-95	30-65	<20	NP-3
	13-19	Fine sandy loam, loam.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	85-95	40-65	<25	NP-5
	19-49	Sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	100	85-95	40-70	20-35	5-15
	49-60	Fine sandy loam, loam.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	85-95	40-65	<25	NP-5
Bosket----------	0-16	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
	16-48	Sandy clay loam, clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	100	85-100	30-70	25-40	5-17
	48-60	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
30---------- Wideman	0-9	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	65-90	30-60	<20	NP-3
	9-21	Fine sandy loam, fine sand, loamy sand.	SM, ML, CL-ML, SM-SC	A-2, A-4	0	100	100	65-100	30-75	<25	NP-5
	21-60	Loamy sand, loamy fine sand, fine sand.	SM, SP-SM	A-2	0	100	70-100	50-75	10-35	---	NP
31B---------- Wilderness	0-13	Cherty silt loam	SM-SC, SC, SP-SC, GC	A-1, A-4, A-2-4	0-10	60-85	50-75	20-50	10-40	20-30	5-10
	13-17	Very cherty silty clay loam, cherty silty clay loam.	GC, GP-GC, SC, SP-SC	A-6, A-2-6	5-15	40-70	20-60	10-50	10-40	25-40	10-20
	17-28	Very cherty silt loam, very cherty silty clay loam.	GM-GC, GC, GP-GC	A-1, A-2-4, A-2-6	10-40	30-60	10-45	10-40	5-35	20-40	5-15
	28-60	Very cherty silty clay, very cherty clay.	GC, GP-GC	A-2-6	10-40	30-60	10-45	10-40	5-35	25-40	15-25
32*. Pits											
33---------- Calhoun	0-16	Silt loam--------	CL-ML, ML, CL	A-4	0	100	100	100	95-100	<31	NP-10
	16-60	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	95-100	95-100	30-45	11-24

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
1	0-11	10-25	1.50-1.55	0.6-2.0	0.20-0.23	5.6-7.8	Low	0.43	5	.5-2
Adler	11-60	5-18	1.50-1.55	0.6-2.0	0.20-0.23	5.6-7.8	Low	0.43		
2	0-7	18-25	1.25-1.50	0.6-2.0	0.16-0.24	4.5-6.0	Low	0.43	5	1-2
Amagon	7-60	20-35	1.25-1.50	0.06-0.2	0.16-0.24	4.5-6.0	Moderate	0.37		
3B	0-19	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-7.3	Low	0.32	4	.5-3
Elk	19-60	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.28		
4D	0-8	18-27	1.40-1.55	0.6-2.0	0.12-0.17	4.5-6.5	Low	0.28	3	.5-2
Bardley	8-27	60-85	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.5	Moderate	0.28		
	27	---	---	---	---	---	---	---		
5B, 5C	0-16	5-15	1.30-1.50	2.0-6.0	0.10-0.15	5.1-6.5	Low	0.24	4	.5-3
Bosket	16-48	18-30	1.25-1.50	0.6-2.0	0.10-0.20	5.1-6.5	Low	0.32		
	48-60	8-15	1.30-1.50	2.0-6.0	0.10-0.15	5.1-6.5	Low	0.32		
6C2	0-6	5-15	1.30-1.50	2.0-6.0	0.10-0.15	5.1-6.5	Low	0.24	4	.5-3
Bosket	6-53	18-30	1.25-1.50	0.6-2.0	0.10-0.20	5.1-6.5	Low	0.32		
	53-60	4-15	1.30-1.60	>2.0	0.02-0.15	5.1-6.5	Low	0.24		
7	0-16	10-27	1.30-1.65	0.2-0.6	0.21-0.23	4.5-6.5	Low	0.49	3	.5-2
Calhoun	16-60	10-35	1.30-1.70	0.06-0.2	0.20-0.22	4.5-6.0	Moderate	0.43		
8B	0-8	10-25	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.43	4	1-2
Captina	8-28	20-35	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.37		
	28-45	35-45	1.40-1.60	0.06-0.2	0.02-0.08	3.6-5.5	High	0.32		
	45-60	40-55	1.20-1.40	0.06-0.2	0.05-0.10	3.6-5.5	High	0.32		
8B2	0-4	10-25	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.43	4	1-2
Captina	4-25	20-35	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.37		
	25-31	35-45	1.40-1.60	0.06-0.2	0.02-0.08	3.6-5.5	High	0.32		
	31-60	40-55	1.20-1.40	0.06-0.2	0.05-0.10	3.6-5.5	High	0.32		
8C	0-8	10-25	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.43	4	1-2
Captina	8-28	20-35	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.37		
	28-45	35-45	1.40-1.60	0.06-0.2	0.02-0.08	3.6-5.5	High	0.32		
	45-60	40-55	1.20-1.40	0.06-0.2	0.05-0.10	3.6-5.5	High	0.32		
8C2	0-4	10-25	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.43	4	1-2
Captina	4-25	20-35	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.37		
	25-31	35-45	1.40-1.60	0.06-0.2	0.02-0.08	3.6-5.5	High	0.32		
	31-60	40-55	1.20-1.40	0.06-0.2	0.05-0.10	3.6-5.5	High	0.32		
9C, 9D, 9F	0-13	14-20	1.30-1.60	2.0-6.0	0.07-0.12	4.5-6.0	Low	0.28	2	1-2
Clarksville	13-43	25-35	1.40-1.65	2.0-6.0	0.06-0.10	4.5-5.5	Low	0.28		
	43-60	40-75	1.40-1.80	2.0-6.0	0.05-0.08	4.5-5.5	Low	0.28		
10D, 10F	0-13	14-20	1.30-1.60	2.0-6.0	0.05-0.09	4.5-6.0	Low	0.28	2	1-2
Clarksville	13-34	25-35	1.40-1.65	2.0-6.0	0.06-0.10	4.5-5.5	Low	0.28		
	34-60	40-75	1.40-1.80	2.0-6.0	0.05-0.08	4.5-5.5	Low	0.28		
11	0-8	10-27	1.30-1.65	0.2-0.6	0.20-0.23	4.5-8.4	Low	0.43	4	.5-2
Crowley	8-45	35-50	1.20-1.80	<0.06	0.19-0.21	4.5-6.5	High	0.32		
	45-60	27-55	1.30-1.80	0.06-0.2	0.20-0.22	5.6-8.4	Moderate	0.32		
12C, 12D, 12F	0-12	18-27	1.10-1.30	2.0-6.0	0.08-0.15	4.5-6.5	Low	0.28	2	.5-2
Doniphan	12-16	27-35	1.20-1.40	0.6-2.0	0.10-0.14	4.5-6.5	Moderate	0.28		
	16-27	48-70	1.20-1.40	0.6-2.0	0.08-0.10	3.6-5.5	Moderate	0.28		
	27-77	48-70	1.20-1.40	0.6-2.0	0.08-0.10	3.6-5.5	Moderate	0.28		

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
13D----------	0-9	18-27	1.10-1.30	2.0-6.0	0.05-0.10	4.5-6.5	Low----------	0.28	2	.5-2
Doniphan	9-60	48-70	1.20-1.40	0.6-2.0	0.08-0.10	3.6-5.5	Moderate-----	0.28		
14B----------	0-19	5-18	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.37	5	.5-2
Dubbs	19-60	10-25	1.40-1.50	2.0-6.0	0.20-0.22	4.5-6.0	Low----------	0.37		
15----------	0-8	10-20	1.25-1.60	0.6-2.0	0.13-0.24	4.5-7.3	Low----------	0.43	3	.5-2
Foley	8-13	20-35	1.25-1.50	0.2-0.6	0.18-0.24	5.1-7.3	Moderate-----	0.43		
	13-60	20-35	1.25-1.50	<0.06	0.10-0.14	5.1-9.0	Moderate-----	0.43		
16D*:										
Gasconade-------	0-4	35-50	1.35-1.50	0.6-2.0	0.10-0.12	6.1-7.8	Moderate-----	0.20	2	2-4
	4-8	35-60	1.45-1.70	0.2-0.6	0.05-0.07	6.1-7.8	Moderate-----	0.20		
	8	---	---	---	---	---	----------	----		
Rock outcrop.										
16F*:										
Gasconade-------	0-6	35-50	1.35-1.50	0.6-2.0	0.10-0.12	6.1-7.8	Moderate-----	0.20	2	2-4
	6-16	35-60	1.45-1.70	0.2-0.6	0.05-0.07	6.1-7.8	Moderate-----	0.20		
	16	---	---	---	---	---	----------	----		
Rock outcrop.										
17C----------	0-5	15-25	1.10-1.40	0.6-2.0	0.12-0.17	5.1-6.5	Low----------	0.32	3	.5-2
Gatewood	5-29	60-85	1.10-1.30	0.06-0.2	0.09-0.12	5.1-6.0	High---------	0.32		
	29-36	60-85	1.10-1.30	0.06-0.2	0.07-0.10	6.1-7.3	High---------	0.32		
	36	---	---	---	---	---	----------	----		
18B----------	0-10	20-27	1.10-1.30	0.6-2.0	0.22-0.24	4.5-6.0	Low----------	0.43	3	1-3
Hartville	10-26	24-40	1.20-1.40	0.06-0.2	0.18-0.21	4.5-5.5	Moderate-----	0.43		
	26-60	35-60	1.20-1.50	0.06-0.2	0.10-0.12	4.5-6.0	High---------	0.32		
19----------	0-16	10-25	1.25-1.45	0.6-2.0	0.16-0.24	5.6-7.3	Low----------	0.37	5	1-3
Hontas	16-60	15-35	1.25-1.45	0.6-2.0	0.16-0.24	5.6-7.8	Low----------	0.37		
20----------	0-12	40-55	1.45-1.65	0.6-2.0	0.18-0.22	4.5-7.3	High---------	0.32	5	1-3
Houlka	12-60	35-55	1.40-1.60	<0.06	0.10-0.13	4.5-5.5	High---------	0.32		
21----------	0-8	18-25	1.25-1.55	0.6-2.0	0.11-0.22	5.1-7.3	Low----------	0.49	5	1-3
Kobel	8-60	35-55	1.15-1.50	<0.06	0.09-0.13	6.1-8.4	Very high----	0.37		
22----------	0-5	10-25	1.30-1.50	0.6-2.0	0.13-0.24	5.1-7.3	Low----------	0.49	1	.5-2
Lafe	5-60	15-40	1.40-1.75	<0.06	0.09-0.15	7.4-9.0	Moderate-----	0.49		
23B----------	0-6	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.43	3	.5-2
Loring	6-33	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	33-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
23B2----------	0-4	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.43	3	<1
Loring	4-27	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	27-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
23C----------	0-6	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.43	3	.5-2
Loring	6-33	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	33-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
23C2----------	0-3	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.43	3	<1
Loring	3-15	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	15-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
23D----------	0-6	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.43	3	.5-2
Loring	6-33	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	33-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		
23D2----------	0-3	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.43	3	<1
Loring	3-22	18-35	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.43		
	22-60	12-25	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low----------	0.43		

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS --Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
24A----------	0-9	15-25	1.10-1.30	2.0-6.0	0.09-0.13	5.6-7.3	Low----------	0.24	4	.5-2
Midco	9-38	15-25	1.20-1.40	2.0-6.0	0.05-0.11	5.1-7.3	Low----------	0.24		
	38-60	15-25	1.10-1.30	2.0-6.0	0.02-0.06	5.1-7.3	Low----------	0.24		
25----------	0-7	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	2-4
Nolin	7-60	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43		
26B, 26C----------	0-8	10-20	1.25-1.45	0.6-2.0	0.16-0.24	4.5-6.0	Low----------	0.37	5	1-3
Peridge	8-60	20-34	1.25-1.45	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.32		
26C2----------	0-5	10-20	1.25-1.45	0.6-2.0	0.16-0.24	4.5-6.0	Low----------	0.37	5	1-3
Peridge	5-60	20-34	1.25-1.45	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.32		
27----------	0-8	15-25	1.10-1.30	0.6-2.0	0.16-0.20	4.5-6.5	Low----------	0.32	3	<2
Secesh	8-22	20-30	1.20-1.40	0.6-2.0	0.13-0.19	4.5-6.0	Low----------	0.32		
	22-60	25-35	1.30-1.50	2.0-6.0	0.03-0.08	4.5-6.0	Low----------	0.24		
28----------	0-13	5-18	1.30-1.60	0.6-2.0	0.11-0.15	4.5-6.0	Low----------	0.24	5	.5-2
Tuckerman	13-19	10-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.24		
	19-49	18-35	1.30-1.60	0.2-0.6	0.12-0.20	4.5-6.0	Low----------	0.32		
	49-60	10-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.24		
29B:										
Tuckerman-------	0-13	5-18	1.30-1.60	0.6-2.0	0.11-0.15	4.5-6.0	Low----------	0.24	5	.5-2
	13-19	10-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.24		
	19-49	18-35	1.30-1.60	0.2-0.6	0.12-0.20	4.5-6.0	Low----------	0.32		
	49-60	10-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.24		
Bosket----------	0-16	5-15	1.30-1.50	2.0-6.0	0.10-0.15	5.1-6.5	Low----------	0.24	4	.5-3
	16-48	18-30	1.25-1.50	0.6-2.0	0.10-0.20	5.1-6.5	Low----------	0.32		
	48-60	8-15	1.30-1.50	2.0-6.0	0.10-0.15	5.1-6.5	Low----------	0.32		
30----------	0-9	4-18	1.40-1.60	2.0-6.0	0.07-0.15	3.6-6.0	Low----------	0.17	5	.5-1
Wideman	9-21	5-18	1.30-1.50	2.0-6.0	0.06-0.20	5.1-7.3	Low----------	0.20		
	21-60	2-12	1.40-1.60	>6.0	0.05-0.11	5.1-7.3	Low----------	0.17		
31B----------	0-13	18-27	1.20-1.45	2.0-6.0	0.07-0.12	4.5-6.5	Low----------	0.28	2-1	.5-2
Wilderness	13-17	25-35	1.30-1.50	0.6-2.0	0.03-0.10	4.5-6.0	Low----------	0.28		
	17-28	20-35	1.70-2.00	0.06-0.2	---	4.5-5.0	Low----------	0.28		
	28-60	40-70	1.50-1.70	0.2-0.6	---	4.5-5.5	Moderate-----	0.28		
32*.										
Pits										
33----------	0-16	10-27	1.30-1.65	0.2-0.6	0.21-0.23	4.5-6.5	Low----------	0.40	3	.5-2
Calhoun	16-60	10-35	1.30-1.70	0.06-0.2	0.20-0.22	4.5-6.0	Moderate-----	0.43		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock depth	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft			In		
1--Adler	C	Occasional	Very brief to long.	Jan-Apr	2.0-3.0	Apparent	Jan-Apr	>60	Moderate	Low.
2--Amagon	D	Occasional	Very brief to brief.	Dec-Apr	1.0-2.0	Perched	Dec-Apr	>60	High	High.
3B--Elk	B	Occasional	Very brief to brief.	Dec-Apr	>6.0	---	---	>60	Moderate	Moderate.
4D--Bardley	C	None	---	---	>6.0	---	---	20-40	Moderate	Moderate.
5B, 5C, 6C2--Bosket	B	None	---	---	>6.0	---	---	>60	Low	Moderate.
7--Calhoun	D	Occasional	Brief to long.	Dec-Apr	0-2.0	Perched	Dec-Apr	>60	High	Moderate.
8B, 8B2, 8C, 8C2--Captina	C	None	---	---	2.0-3.0	Perched	Dec-Apr	>60	High	High.
9C, 9D, 9F, 10D, 10F--Clarksville	B	None	---	---	>6.0	---	---	>60	Low	High.
11--Crowley	D	None	---	---	0.5-1.5	Perched	Dec-Apr	>60	High	Moderate.
12C, 12D, 12F, 13D--Doniphan	B	None	---	---	>6.0	---	---	>60	Moderate	High.
14B--Dubbs	B	None	---	---	>6.0	---	---	>60	Moderate	Moderate.
15--Foley	D	None	---	---	0-1.0	Perched	Dec-Apr	>60	High	Low.
16D*, 16F*: Gasconade	D	None	---	---	>6.0	---	---	4-20	High	Low.
Rock outcrop.										
17C--Gatewood	C	None	---	---	>6.0	---	---	20-40	High	Moderate.
18B--Hartville	C	Occasional	Very brief.	Nov-Mar	1.5-3.0	Perched	Nov-Mar	>60	Moderate	Moderate.
19--Hontas	B	Occasional	Very brief to brief.	Dec-Apr	2.0-2.5	Apparent	Dec-Apr	>60	Moderate	Low.
20--Houlka	D	Occasional	Brief to long.	Jan-Mar	1.0-2.0	Apparent	Jan-Mar	>60	High	High.
21--Kobel	D	Occasional	Brief to very long.	Oct-May	0-1.0	Perched	Dec-Apr	>60	High	Moderate.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock depth	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft			In		
22--- Lafe	D	None	---	---	0-1.0	Perched	Dec-Apr	>60	High	Moderate.
23B, 23B2, 23C, 23C2, 23D, 23D2--- Loring	C	None	---	---	2.0-3.0	Perched	Dec-Mar	>60	Moderate	Moderate.
24A--- Midco	A	Occasional	Very brief.	Nov-Apr	>6.0	---	---	>60	Low	Moderate.
25--- Nolin	B	Occasional	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	Low	Moderate.
26B, 26C, 26C2--- Peridge	B	None	---	---	>6.0	---	---	>60	Moderate	Moderate.
27--- Secesh	B	Occasional	Very brief.	Nov-Apr	>6.0	---	---	>60	Low	Moderate.
28--- Tuckerman	D	Occasional	Brief to long.	Dec-Apr	0-1.0	Perched	Dec-Apr	>60	High	Moderate.
29B*: Tuckerman	D	Occasional	Brief to long.	Dec-Apr	0-1.0	Perched	Dec-Apr	>60	High	Moderate.
Bosket	B	None	---	---	>6.0	---	---	>60	Low	Moderate.
30--- Wideman	A	Occasional	Very brief.	Dec-May	>6.0	---	---	>60	Low	Low.
31B--- Wilderness	C	None	---	---	1.0-2.0	Perched	Dec-Mar	>60	Low	High.
32*. Pits										
33--- Calhoun	D	None	---	---	0-2.0	Perched	Dec-Apr	>60	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adler	Coarse-silty, mixed, nonacid, thermic Aquic Udifluvents
Amagon	Fine-silty, mixed, thermic Typic Ochraqualfs
Bardley	Very-Fine, mixed, mesic Typic Hapludalfs
Bosket	Fine-loamy, mixed, thermic Mollic Hapludalfs
Calhoun	Fine-silty, mixed, thermic Typic Glossaqualfs
*Captina	Fine-silty, mixed, mesic Typic Fragiudults
Clarksville	Loamy-skeletal, siliceous, mesic Typic Paleudults
Crowley	Fine, montmorillonitic, thermic Typic Albaqualfs
Doniphan	Clayey, mixed, mesic Typic Paleudults
Dubbs	Fine-silty, mixed, thermic Typic Hapludalfs
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Foley	Fine-silty, mixed, thermic Albic Glossic Natraqualfs
Gasconade	Clayey-skeletal, mixed, mesic Lithic Hapludolls
Gatewood	Very-fine, mixed, mesic Typic Hapludalfs
Hartville	Fine, mixed, mesic Aquic Hapludalfs
Hontas	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Houlka	Fine, montmorillonitic, acid, thermic Vertic Haplaquepts
Kobel	Fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Lafe	Fine-silty, mixed, thermic Glossic Natrudalfs
Loring	Fine-silty, mixed, thermic Typic Fragiudalfs
Midco	Loamy-skeletal, siliceous, nonacid, mesic Typic Udifluvents
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Peridge	Fine-silty, mixed, mesic Typic Paleudalfs
Secesh	Fine-loamy, siliceous, mesic Ultic Hapludalfs
Tuckerman	Fine-loamy, mixed, thermic Typic Ochraqualfs
Wideman	Sandy, siliceous, mesic Typic Udifluvents
Wilderness	Loamy-skeletal, siliceous, mesic Typic Fragiudalfs

* This soil is a taxadjunct to the series. See text for description of those characteristics of the soil that are outside the range of the series.

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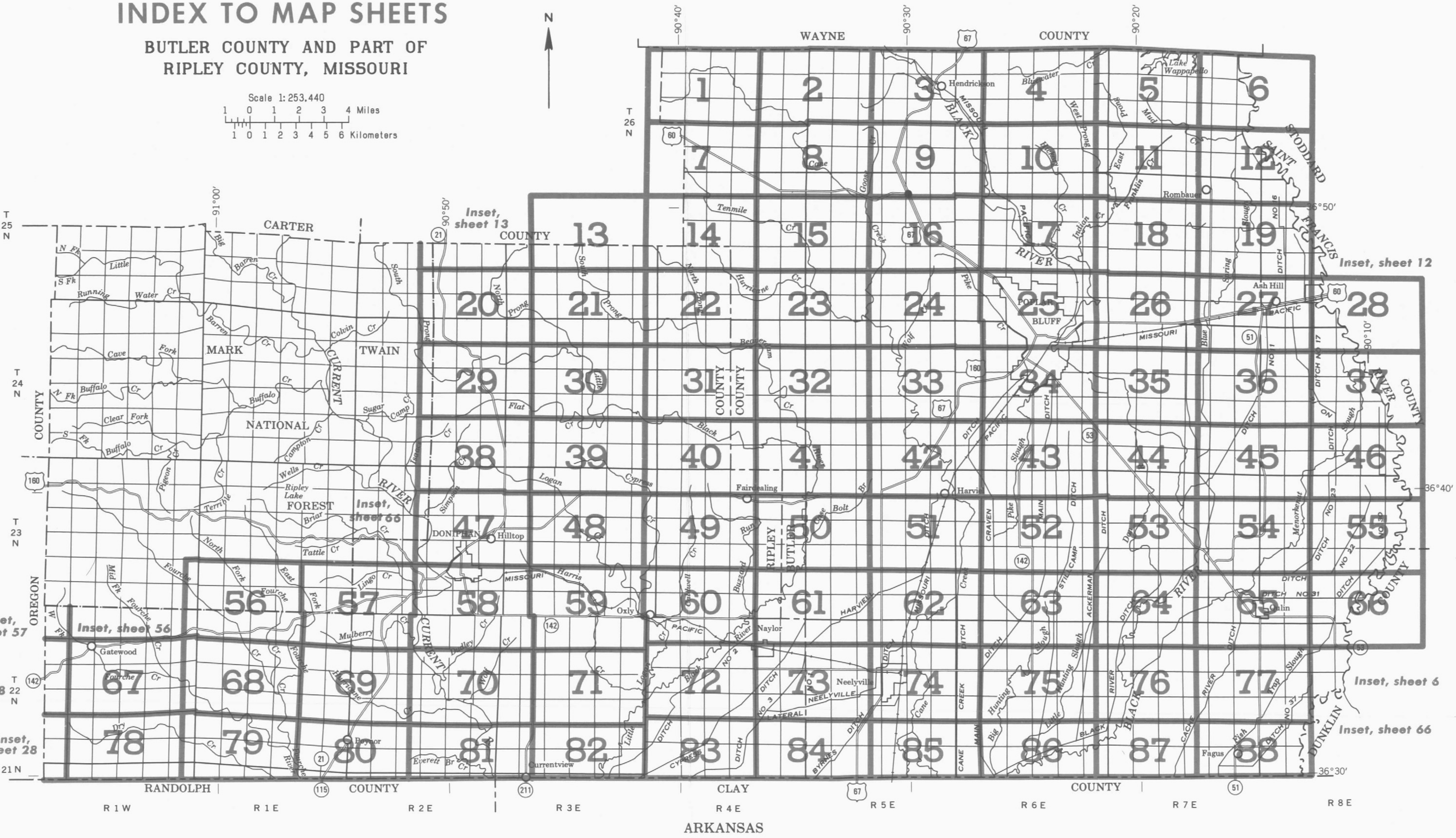
INDEX TO MAP SHEETS

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI



CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

State

County

Reservation (national forest and state forest)

Neatline

AD HOC BOUNDARY

Cemetery

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections)

ROAD EMBLEMS & DESIGNATIONS

Federal

State

County

LEVEES

Without road

DAMS

Medium or small

PITS

Gravel pit

Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

Church

School

WATER FEATURES

DRAINAGE

Perennial, double line

Perennial, single line

Intermittent

Drainage end

Ditches

LAKES, PONDS AND RESERVOIRS

Perennial

MISCELLANEOUS WATER FEATURES

Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

Other than bedrock (points down slope)

DEPRESSION OR SINK

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is eroded.

SYMBOL	NAME
1	Adler silt loam
2	Amagon silt loam
3B	Elk silt loam, 1 to 4 percent slopes
4D	Bardley cherty silt loam, 9 to 14 percent slopes
5B	Bosket fine sandy loam, 2 to 5 percent slopes
5C	Bosket fine sandy loam, 5 to 9 percent slopes
6C2	Bosket fine sandy loam, 4 to 10 percent slopes, eroded
7	Calhoun silt loam, occasionally flooded
8B	Captina silt loam, 2 to 5 percent slopes
8B2	Captina silt loam, 2 to 5 percent slopes eroded
8C	Captina silt loam, 5 to 9 percent slopes
8C2	Captina silt loam, 5 to 9 percent slopes, eroded
9C	Clarksville very cherty silt loam, 2 to 9 percent slopes
9D	Clarksville very cherty silt loam, 9 to 14 percent slopes
9F	Clarksville very cherty silt loam, 14 to 35 percent slopes
10D	Clarksville stony silt loam, 5 to 14 percent slopes
10F	Clarksville stony silt loam, 14 to 35 percent slopes
11	Crowley silt loam
12C	Doniphan very cherty silt loam, 2 to 9 percent slopes
12D	Doniphan very cherty silt loam, 9 to 14 percent slopes
12F	Doniphan very cherty silt loam, 14 to 35 percent slopes
13D	Doniphan stony silt loam, 5 to 14 percent slopes
14B	Dubbs silt loam, 0 to 5 percent slopes
15	Foley silt loam
16D	Gasconade-Rock outcrop complex, 2 to 14 percent slopes
16F	Gasconade-Rock outcrop complex, 14 to 30 percent slopes
17C	Gatewood cherty silt loam, 2 to 9 percent slopes
18B	Hartville silt loam, 1 to 4 percent slopes
19	Hontas silt loam
20	Houlka silty clay loam
21	Kobel clay
22	Lafe silt loam
23B	Loring silt loam, 2 to 5 percent slopes
23B2	Loring silt loam, 2 to 5 percent slopes, eroded
23C	Loring silt loam, 5 to 9 percent slopes
23C2	Loring silt loam, 5 to 9 percent slopes, eroded
23D	Loring silt loam, 9 to 14 percent slopes
23D2	Loring silt loam, 9 to 14 percent slopes, eroded
24A	Midco cherty loam, 1 to 3 percent slopes
25	Nolin silt loam
26B	Peridge silt loam, 2 to 5 percent slopes
26C	Peridge silt loam, 5 to 9 percent slopes
26C2	Peridge silt loam, 5 to 9 percent slopes, eroded
27	Secesh silt loam
28	Tuckerman fine sandy loam
29B	Tuckerman-Bosket fine sandy loams, 0 to 5 percent slopes
30	Wideman fine sandy loam, 0 to 5 percent slopes
31B	Wilderness cherty silt loam, 2 to 7 percent slopes
32	Pits
33	Calhoun silt loam

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 1

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

445 000 FEET

395 000 FEET

R. 4 E

WAYNE COUNTY

T. 26 N.

CARTER COUNTY

MARK TWAIN NATIONAL FOREST

North Fork

Hollow

Creek

Cane

King

Hollow

Cane

Creek

Drury

(Joins sheet 2)

(Joins sheet 7)

465 000 FEET

1 MILE

1 KILOMETER

0 1/4 0.5 1/2 3/4

385 000 FEET

Scale 1:20000

N

10

N

Scale 1:20000

1 MILE

1 KILOMETER

0 1/4 1/2 3/4 1

0 0.5 1

(Joins sheet 4)

R. 6 E.

540 000 FEET

380 000 FEET

(Joins sheet 9)

370 000 FEET

(Joins sheet 17)

520 000 FEET

T. 25 N. | T. 26 N.

(Joins sheet 11)

MARK TWAIN NATIONAL FOREST

Wilby

RAILROAD

BLACK RIVER

Black Creek

Indian Creek

Hickory Creek

West Prong

water

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BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 10

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 11

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4000 AND 5000-FOOT GRID TICKS

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 13

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 13

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

13

N

1 MILE
1 KILOMETER
0 1/4 1/2 3/4
0 0.5 1

Scale 1:20000

14

N

R. 3 E. | R. 4 E.

(Joins sheet 7)

465 000 FEET

360 000 FEET

T. 25 N.

(Joins sheet 15)

(Joins sheet 13)

350 000 FEET

445 000 FEET

(Joins sheet 22)

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1

1/4 1/2 3/4

NUBBIN HOLLOW

PINHOOK HILL

Termite Creek

Harmon Branch

CARTER COUNTY

BUTLER COUNTY

RIPLEY COUNTY

North Prong Beaverdam Creek

Beaver Lake

8 9 10 17 16 15 24 19 20 21 22

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BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 14

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 15

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 15

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R. 4 E. | R. 5 E.

470 000 FEET

360 000 FEET

T. 25 N.

(Joins sheet 8)

(Joins sheet 16)

(Joins sheet 14)

(Joins sheet 23)

490 000 FEET

350 000 FEET

MARK TWAIN NATIONAL FOREST

Pine Grove Camp

Tenmile Branch

Camp Creek

SMOKY HOLLOW

SLASHY HOLLOW

MALLADY HOLLOW

Creek

1 MILE

1 KILOMETER

Scale 1:20000

15

N

1 MILE
1 KILOMETER
Scale 1:20000
0 1/4 1/2 3/4 1
0 0.5 1

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BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 17

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 17

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

17

N

R. 6 E.

520 000 FEET

365 000 FEET

(Joins sheet 10)

(Joins sheet 16)

T. 25 N.

535 000 FEET

350 000 FEET

(Joins sheet 25)

(Joins sheet 18)

MARK TWAIN NATIONAL FOREST

POPLAR BLUFF STATE FOREST

BLACK RIVER

Mill Creek

Buck Creek

Indian Creek

Hilliard

Lake Lockloma

Carpenter Lake

RAILROAD

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 18

18

N

R. 6 E. | R. 7 E.

560 000 FEET

(Joins sheet 11)

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 26)

360 000 FEET

350 000 FEET

540 000 FEET

T. 25 N.

MARK TWAIN NATIONAL FOREST

POPLAR BLUFF STATE FOREST

Franklin Creek

Indian Creek

Canal

Creek

water

1 MILE

1 KILOMETER

Scale 1:20000

0 0 1/4 0.5 1/2 3/4 1

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 18

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BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 19

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 19

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

565 000 FEET

R. 7 E.

R. 8 E.

(Joins sheet 12)

360 000 FEET

T. 25 N.

(Joins sheet 18)

(Joins sheet 27)

585 000 FEET

350 000 FEET

SNYDER DITCH

NO. 11 DITCH

NO. 16 DITCH

NO. 17 DITCH

St. Francis

STODDARD COUNTY

Slough

Spring

Blue

Panther Run Slough

14B

5B

29B

7

2

15

10

11

12

13

14

18

19

20

22

23

24

8

17

N

1 MILE

1 KILOMETER

0 0 0.5 1/4 1/2 3/4

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 2

2

N

R. 4 E. | R. 5 E. | WAYNE COUNTY

490 000 FEET

395 000 FEET

T. 26 N.

(Joins sheet 1)

(Joins sheet 3)

385 000 FEET

470 000 FEET

(Joins sheet 8)

RIDGE

FLAT

RIDGE

CANE

Liggett Creek

MARK TWAIN NATIONAL FOREST

WILEY

KING

HOLLOW

Eastman Spring

SPRING

EASSMAN

Dry

Cane Branch Creek

1 MILE

1 KILOMETER

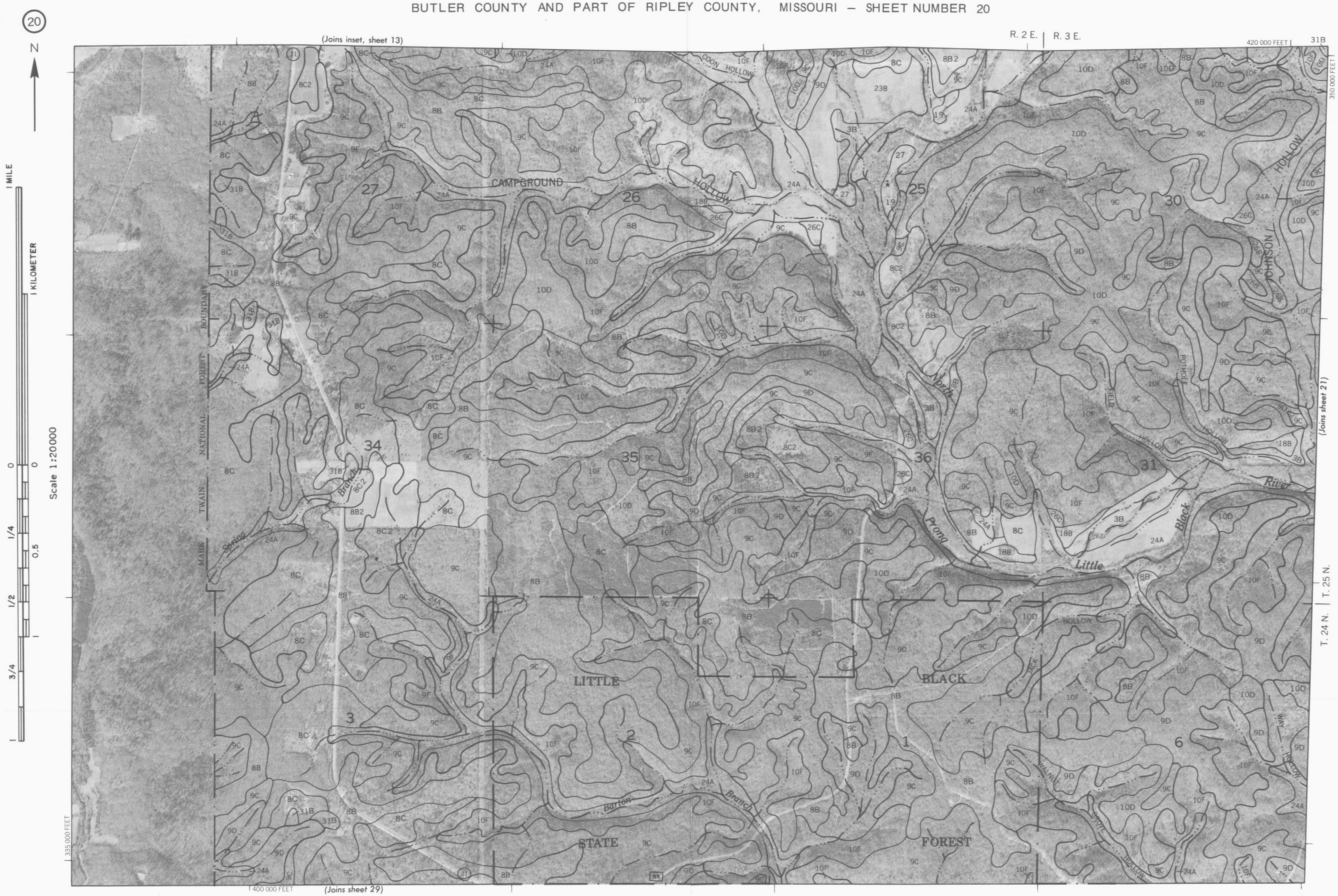
Scale 1:20000

0 0.5 1

1/4 1/2 3/4

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 2



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 20

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 21

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 21

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

21

N

1 MILE

1 KILOMETER

Scale 1:20000

425 000 FEET

350 000 FEET

335 000 FEET

440 000 FEET

R. 3 E.

T. 24 N. | T. 25 N.

(Joins sheet 13)

(Joins sheet 20)

(Joins sheet 22)

(Joins sheet 30)

RIDGE

GABLES

Mud Branch

North Prong DEVILS BACKBONE

Little Black River

South Prong Beaverdam Creek

Budapest

STATE PUBLIC HUNTING AREA

GRANDIN LOOKOUT TOWER

Camp Semoca

HOLLOW WAY

22

N

R. 3 E. | R. 4 E.

(Joins sheet 14)

465 000 FEET

345 000 FEET

(Joins sheet 21)

(Joins sheet 23)

335 000 FEET

445 000 FEET

(Joins sheet 31)

T. 24 N. | T. 25 N.

Scale 1:20000

1 MILE

1 KILOMETER

0 1/4 0.5 1/2 0 3/4 1

MARK TWAIN NATIONAL FOREST

RIPLEY COUNTY
BUTLER COUNTY

EVERHART HOLLOW

North Prong

South Prong

Beaverdam Creek

MURPHY HOLLOW

Beaverdam

25 30 29 28 27 36 31 32 33 34 1 6 5 4 3

8B 8B2 8C 9C 9D 9F 10D 10F 12C 12D 24A 26B 26C 27 31B 3B 4D 8B 18B 23B

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land d.v.s.ion corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 22

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 23

R. 4 E. | R. 5 E.

470 000 FEET

345 000 FEET

(Joins sheet 15)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 32)

490 000 FEET

335 000 FEET

T. 25 N.

T. 24 N.

N

1 MILE

1 KILOMETER

0 0

1/4 1/2 3/4

0.5

Scale 1:20000

MARK TWAIN NATIONAL FOREST

RIDGE OAK

Milltown

Stringtown

Hurricane Creek

Old Still Hollow

Procter Branch

Termite Creek

Cane Ct.

Fletcher Branch

Beaverdam Ct.

26 25 30 29 28 35 36 31 32 33 2 1 6 5 4

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 23

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 24

24

N

(Joins sheet 16)

R. 5 E. | R. 6 E.

515 000 FEET

MARK TWAIN NATIONAL FOREST

Cane Creek · Wolf Creek · Pike Creek · Cane Creek Branch · Fletcher Creek · Wolf Creek · Kenner Spring Branch

Cedar Valley · Green Forest

(Joins sheet 23)

(Joins sheet 25)

335 000 FEET

(Joins sheet 33) | 495 000 FEET

T. 24 N. | T. 25 N.

1 MILE

1 KILOMETER

Scale 1:20000

0 0.5 1

1/4 1/2 3/4

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 24

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 25

25

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 25

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

520 000 FEET

R. 6 E.

(Joins sheet 17)

345 000 FEET

T. 25 N.

T. 24 N.

(Joins sheet 24)

(Joins sheet 26)

335 000 FEET

535 000 FEET

(Joins sheet 34)

N

1 MILE

1 KILOMETER

Scale 1:20000

0 0 1/4 1/2 3/4 0.5

Loma Linda

Shady Dell

POPLAR

BLUFF
(county seat)

CITY CEMETERY

WOODLAWN CEMETERY

BACON MEMORIAL PARK

GAGINS STATION

BLACK RIVER

RAILROAD

Pike Creek

Palmer Slough

29 28 27 26 25

32 33 34 35 36

5 4 3 2 1

26

N

R. 6 E. | R. 7 E.

(Joins sheet 18)

560 000 FEET

345 000 FEET

(Joins sheet 25)

(Joins sheet 27)

335 000 FEET

540 000 FEET

(Joins sheet 35)

T. 24 N. | T. 25 N.

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1

1/4 1/2 3/4 1

Earl Fields Memorial Airfield

BLACK R.

RAILROAD

RAILROAD

25 30 29 28 27

31 32 33 34

36 1 6 5 4 3

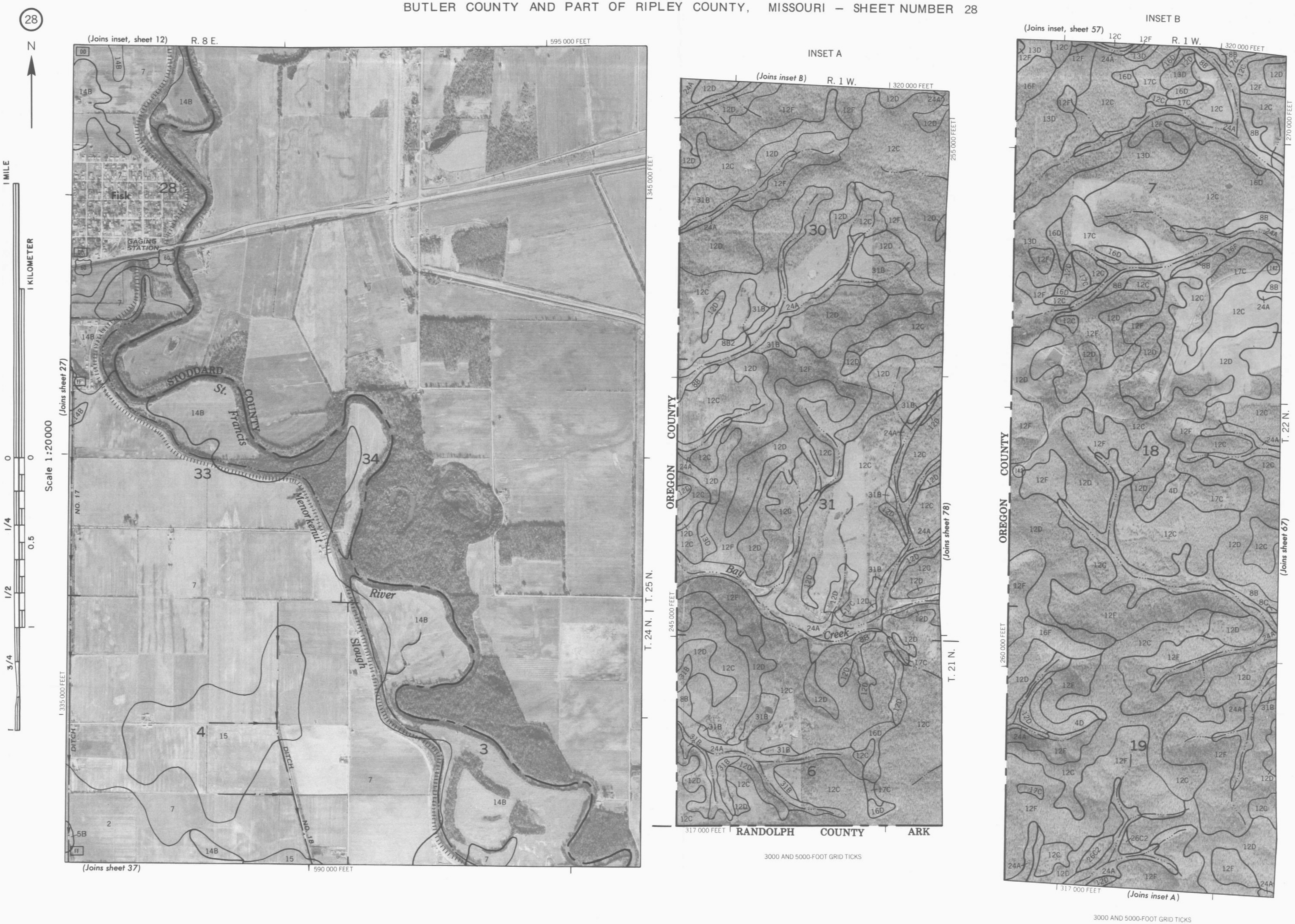
This map is compiled on 1971 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 26

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 27

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 27

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 28

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 29

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 29

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

29

N

400,000 FEET

330,000 FEET

R. 2 E. | R. 3 E.

(Joins sheet 20)

(Joins sheet 30)

(Joins sheet 38)

420 000 FEET

320 000 FEET

T. 24 N.

LITTLE BLACK RIVER

STATE FOREST

FOREST BOUNDARY

NATIONAL MARK TWAIN

Barton Branch

Walnut Grove Hollow

Black River

South Prong Little Black

South Prong Little Black River

Flat Creek

10 11 12 13 14 15 18 19 22 23 24

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1/4 1/2 3/4 1

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 3

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WAYNE COUNTY

R. 5 E. | R. 6 E.

495 000 FEET

395 000 FEET

T. 26 N.

Keeners

BLACK RIVER

Swift Creek

MARK TWAIN NATIONAL FOREST

Hendrickson

BLACKBERRY

HEATHER HOLLOW

LINK HOLLOW

SPRING HOLLOW

MAGILL HOLLOW

HAPPY HOLLOW

RAILROAD

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 9)

385 000 FEET

515 000 FEET

3

N

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 30

30

N

(Joins sheet 21)

R. 3 E.

440 000 FEET

330 000 FEET

T. 24 N.

(Joins sheet 31)

(Joins sheet 29)

320 000 FEET

(Joins sheet 39)

425 000 FEET

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1/4 1/2 3/4

GREENVILLE FORD

Black River

Little Black R.

N. Prong Little Black R.

Little River

South Prong

Black Hollow

Brushy

Flat Creek

Flat Cr.

Little

Black

Flat

Creek

River

water

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 30

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

32

N

Scale 1:20000

1 MILE 0 1/4 1/2 3/4

1 KILOMETER 0 0.5

(Joins sheet 23)

(Joins sheet 31)

(Joins sheet 41)

(Joins sheet 33)

R. 4 E. | R. 5 E.

T. 24 N.

490 000 FEET

330 000 FEET

320 000 FEET

470 000 FEET

Stringtown

Beaverdam Creek

Beaverdam Creek

Dolly Branch

Fletcher Branch

LONE HILL LOOKOUT TOWER

STATE PUBLIC HUNTING AREA

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 32

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 33

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 33

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

R. 5 E. | R. 6 E.

(Joins sheet 24)

495 000 FEET

330 000 FEET

T. 24 N.

(Joins sheet 32)

(Joins sheet 34)

(Joins sheet 42)

515 000 FEET

Wolf Cane Branch

Cane Creek

Spring Branch

water

Kenner

Cane Branch

Haw Creek

33

N

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 34

34

N

1 MILE

1 KILOMETER

0 0

Scale 1:20000

1/4 0.5

1/2

3/4

(Joins sheet 25)

R. 6 E.

535 000 FEET

330 000 FEET

T. 24 N.

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 43)

520 000 FEET

320 000 FEET

POPLAR BLUFF
(county seat)

SEWAGE LAGOON

SEWAGE LAGOON

SEWAGE LAGOON

RAILROAD

BLACK RIVER

water

Black Creek

Pike Creek

Pike Slough

DITCH

DITCH

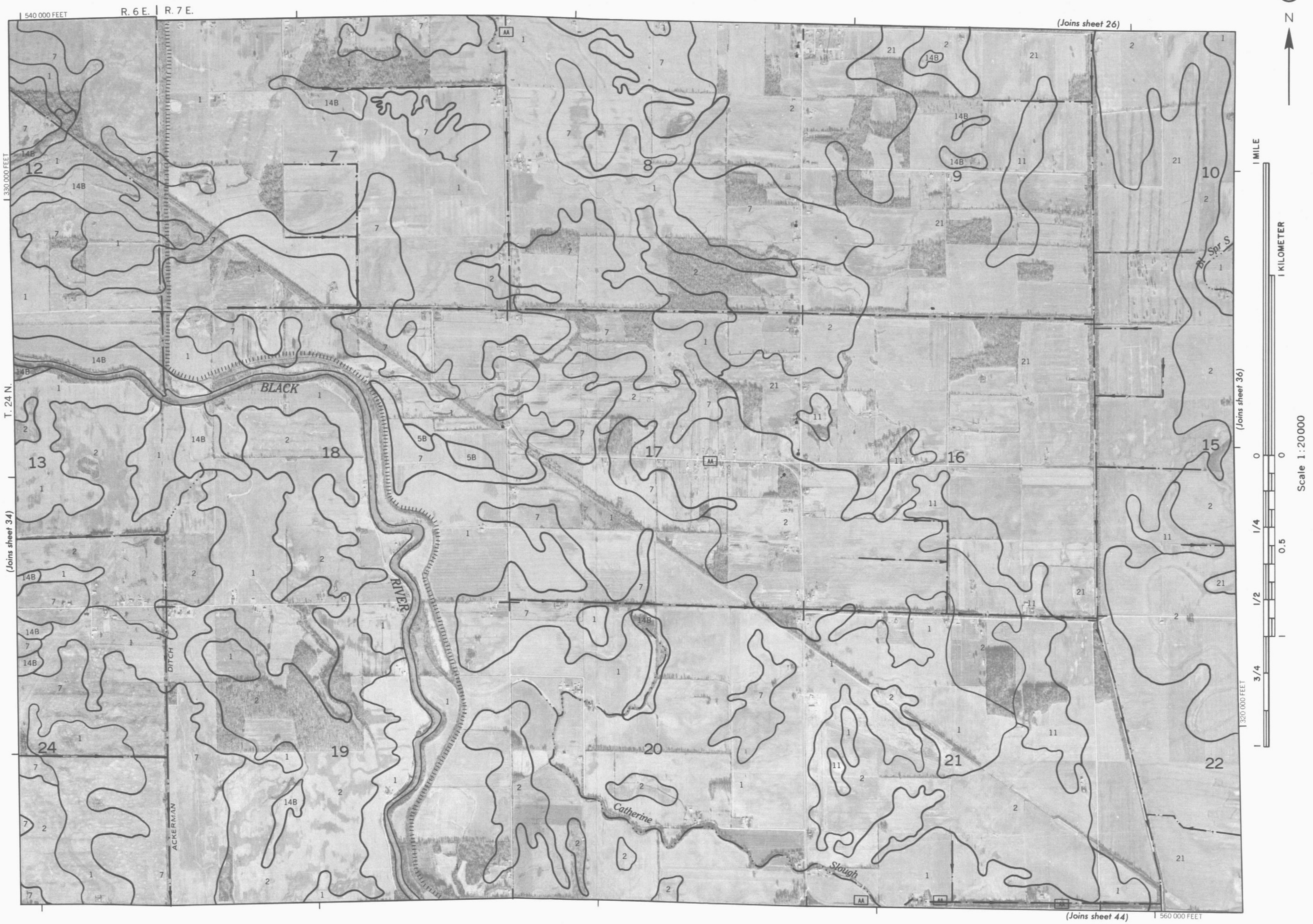
MAIN DITCH

CRAVEN RAILROAD

8 9 10 11 12 13 14 15 16 17 20 21 22 23 24

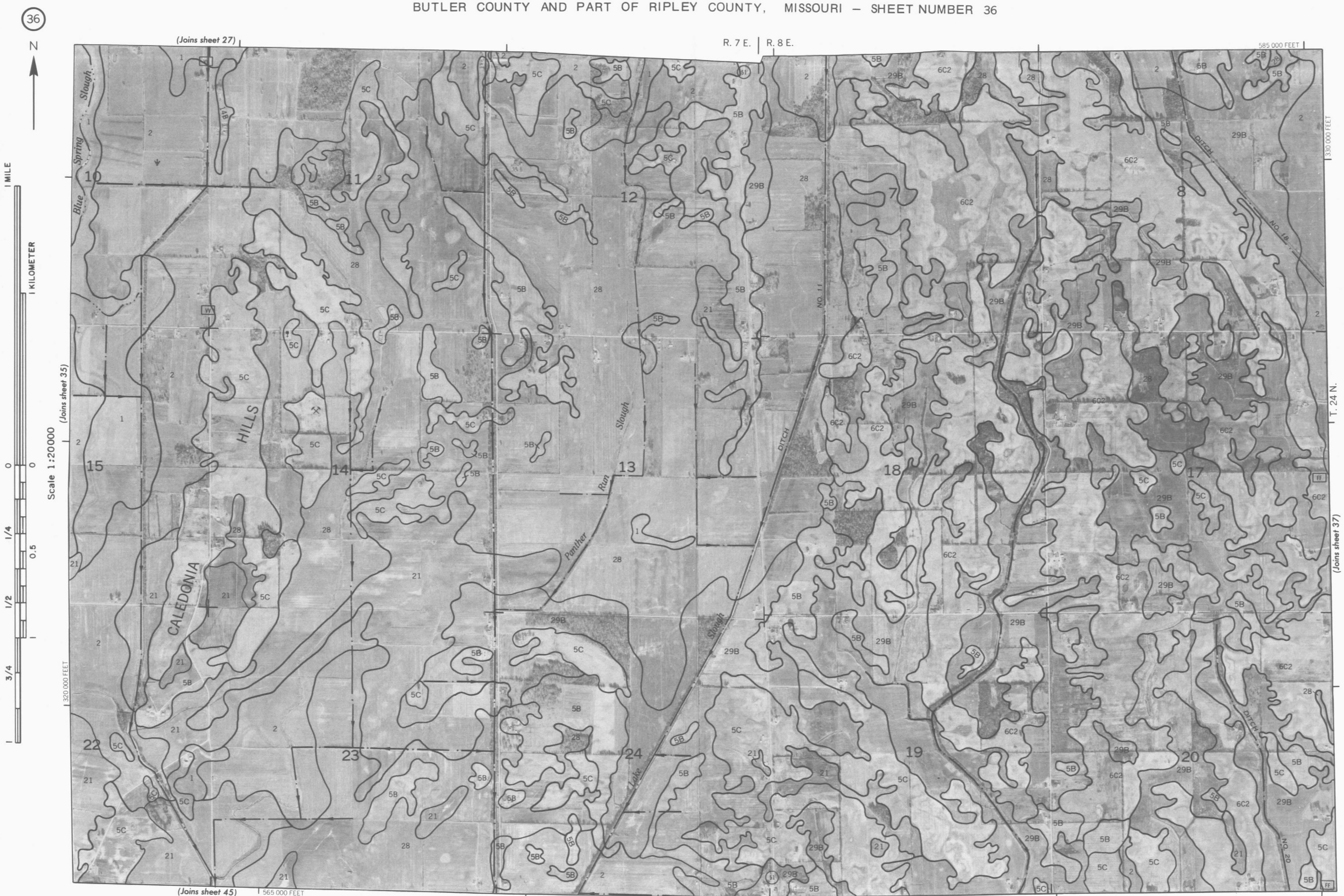
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 34



BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 35

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTTER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 37

37

N

590 000 FEET

330 000 FEET

320 000 FEET

605 000 FEET

(Joins sheet 28)

(Joins sheet 36)

(Joins sheet 46)

R. 8 E.

T. 24 N.

St. Francis River

Stoddard County

Memorkenut Slough

NO. 18 DITCH

NO. 15 DITCH

9 10 11 14 15 16 21 22 23 24

1 MILE

1 KILOMETER

0 0

1/4 0.5

1/2

3/4

Scale 1:20000

BUTTER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 37

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 38

N

1 MILE

1 KILOMETER

Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 38

39

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 39

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 4

4

N

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1

1/4 1/2 3/4

WAYNE COUNTY

R. 6 E.

540 000 FEET

395 000 FEET

385 000 FEET

520 000 FEET

T. 26 N.

(Joins sheet 3)

(Joins sheet 5)

(Joins sheet 10)

MARK TWAIN NATIONAL FOREST

WAPPAPELLO RESERVATION

Bluewater Creek

West Prong Indian Creek

Collins Store

8 9 10 11 12 13 14 15 16 17 20 21 22 23 24

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 4

This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 40

40

N

R. 3 E. | R. 4 E. (Joins sheet 31)

465 000 FEET

315 000 FEET

(Joins sheet 39)

305 000 FEET

445 000 FEET

(Joins sheet 49)

T. 23 N. | T. 24 N. (Joins sheet 41)

Scale 1:20000

1 MILE 0 1/4 1/2 3/4

1 KILOMETER 0 0.5

Little Black River

Black River

SLAYTON FORD

BONANZA

HOLLOW

HOLLOW

RIPLEY COUNTY

BUTLER COUNTY

CAMPGROUND

Bonanza Spring

Clipper Creek

25 30 29 28 27

36 31 32 33 34

1 6 5 4 3

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 40

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 41

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 41

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

470 000 FEET

R. 4 E. | R. 5 E.

(Joins sheet 32)

315 000 FEET

T. 23 N. | T. 24 N.

(Joins sheet 40)

(Joins sheet 42)

305 000 FEET

490 000 FEET

(Joins sheet 50)

Beaverdam Creek

Little Black Branch

Spall Ridge

Lone Hill

SEMO Camp

Myers Lake

RIPLEY COUNTY

BUTLER COUNTY

41

N

1 MILE

1 KILOMETER

Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 43

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 43

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

520 000 FEET

R. 6 E.

(Joins sheet 34)

315 000 FEET

T. 24 N.

T. 23 N.

(Joins sheet 42)

(Joins sheet 44)

535 000 FEET

(Joins sheet 52)

305 000 FEET

RAILROAD

Slough

DITCH

DITCH

Pike

MAIN

STILLCAMP

CRAVEN

DITCH

29 28 27 26 25

32 33 34 35 36

5 4 3 2 1

14B 5B UU 142 53

1 MILE

1 KILOMETER

0 0 1/4 1/2 3/4

0.5

Scale 1:20000

43

N

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 44

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 44

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 45

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

565 000 FEET

315 000 FEET

R. 7 E. | R. 8 E.

T. 24 N. (Joins sheet 44)

T. 23 N.

(Joins sheet 36)

(Joins sheet 46)

(Joins sheet 54)

585 000 FEET

305 000 FEET

Batesville

Hanleyville

Broseley

Slough

Lake

HILLS

ASH

Menorkemut

DITCH NO. 11

DITCH NO. 18

DITCH NO. 20

45

N

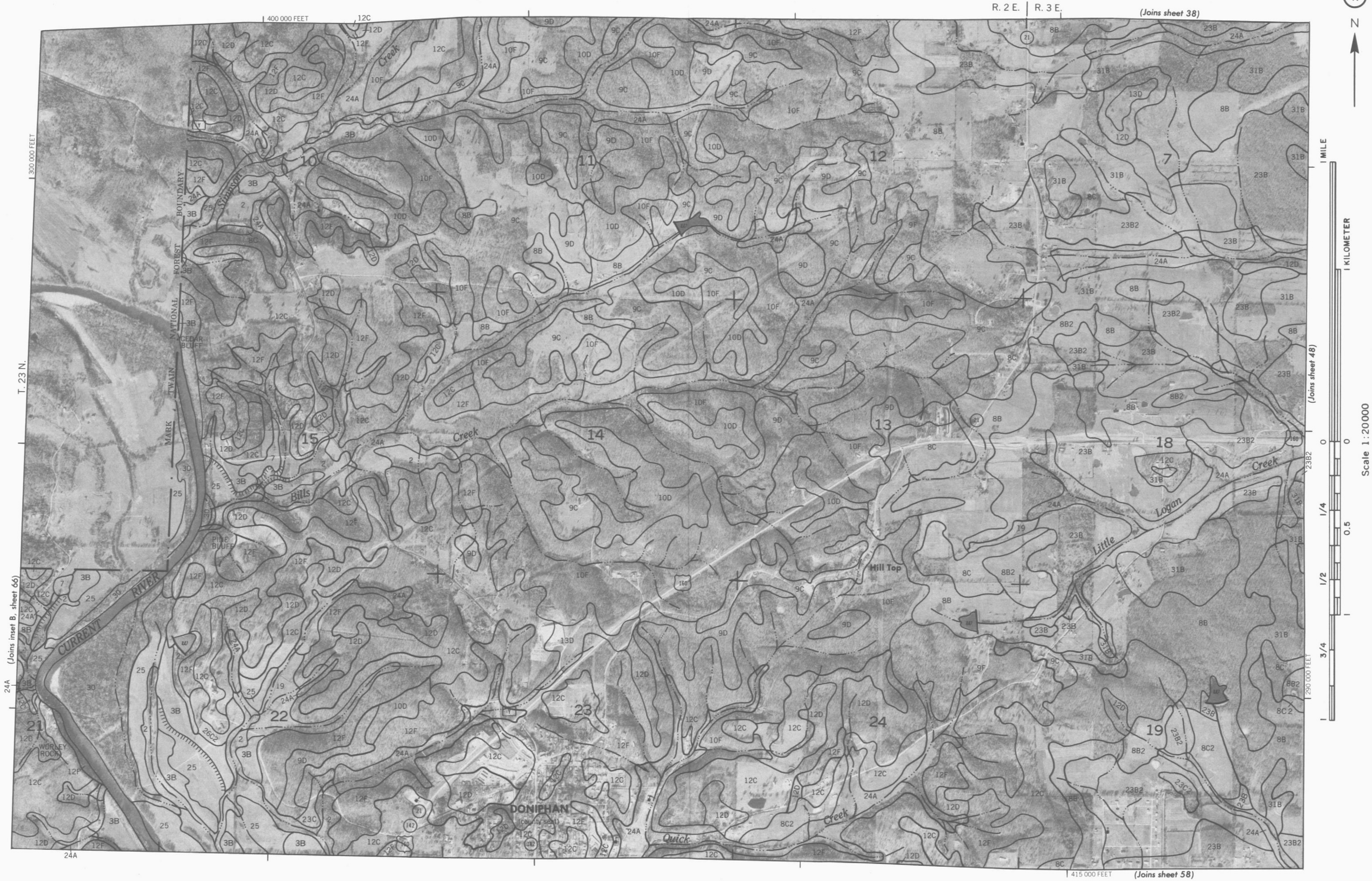
1 MILE

1 KILOMETER

Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 46



BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 47

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

48

N

(Joins sheet 39)

R. 3 E.

440 000 FEET

300 000 FEET

T. 23 N.

(Joins sheet 47)

(Joins sheet 49)

290 000 FEET

420 000 FEET

(Joins sheet 59)

Scale 1:20000

1 MILE

1 KILOMETER

0 1/4 0.5 1/2 3/4

Little Logan Creek

Logan Creek

Dry Cypress Creek

Branch

Logan Creek

Creek

8 9 10 11 12 13 14 15 16 17 20 21 22 23 24

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 48

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 49

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 49

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 5

R. 6 E. | R. 7 E.

545 000 FEET

WAYNE COUNTY

395 000 FEET

T. 26 N.

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 11)

560 000 FEET

385 000 FEET

WAPPAPELLO RESERVATION

MARK TWAIN NATIONAL FOREST

Lake Wappapello

Bluewater

Airstrip

Fish Hatchery

University of Missouri Forestry Camp

Davis Landing Strip

East Prong Indian Creek

Mud Creek

Hollow Spring Gum Hollow Mayham Hollow Moores Run Hail Hollow

RA

5

N

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 5

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 50

50

N

1 MILE

1 KILOMETER

Scale 1:20000

0 0.5 1

1/4 1/2 3/4

(Joins sheet 41)

(Joins sheet 49)

(Joins sheet 51)

(Joins sheet 61)

R. 4 E. | R. 5 E.

T. 23 N.

490 000 FEET

300 000 FEET

290 000 FEET

470 000 FEET

Little Branch

Buzzard Run

GOBBLER KNOB

Bolt Branch

Black Case Branch

Fox Branch

BALL MILL BRIDGE

Taft

RIPLEY COUNTY

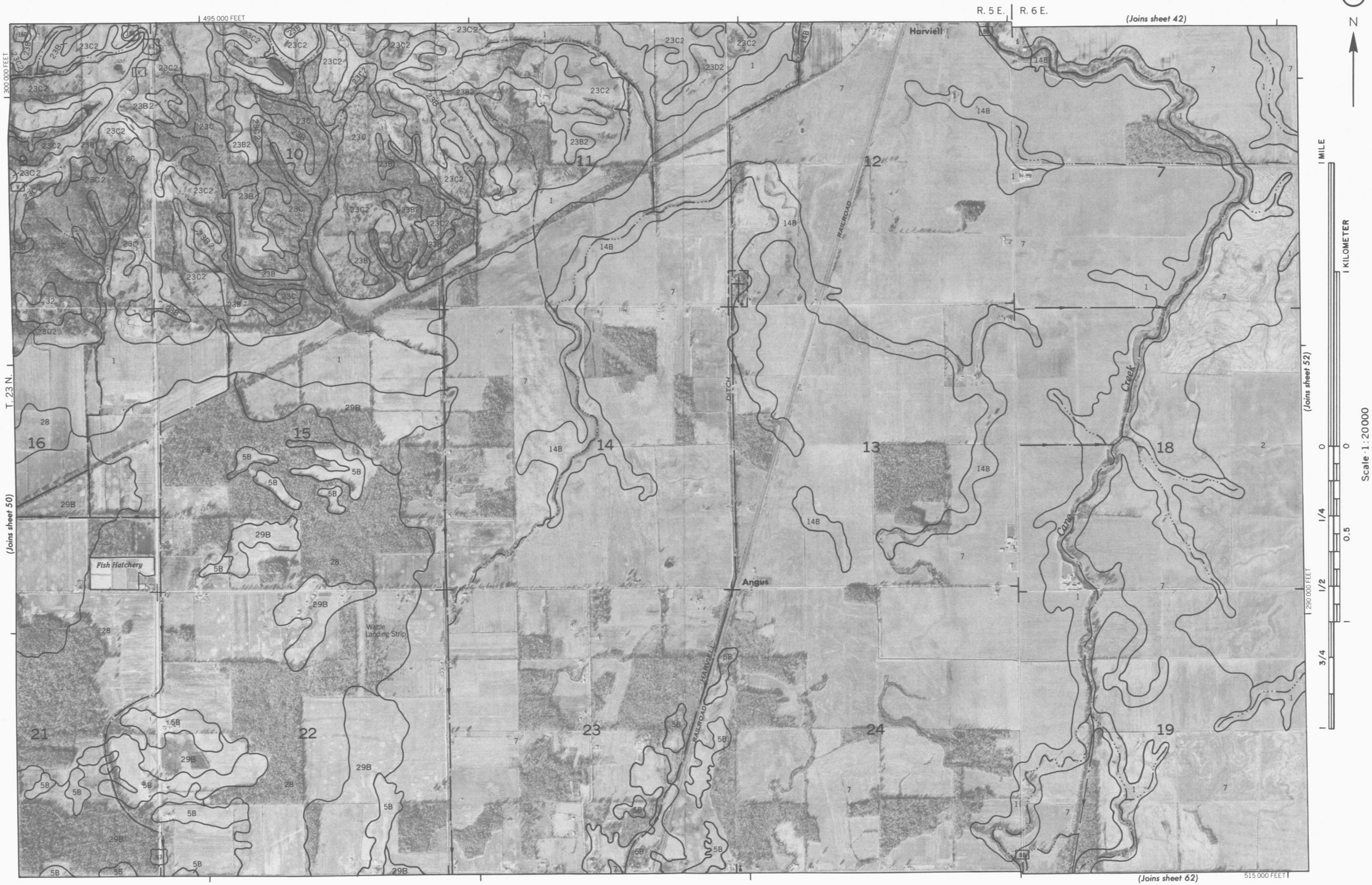
BUTLER COUNTY

Coppel

River

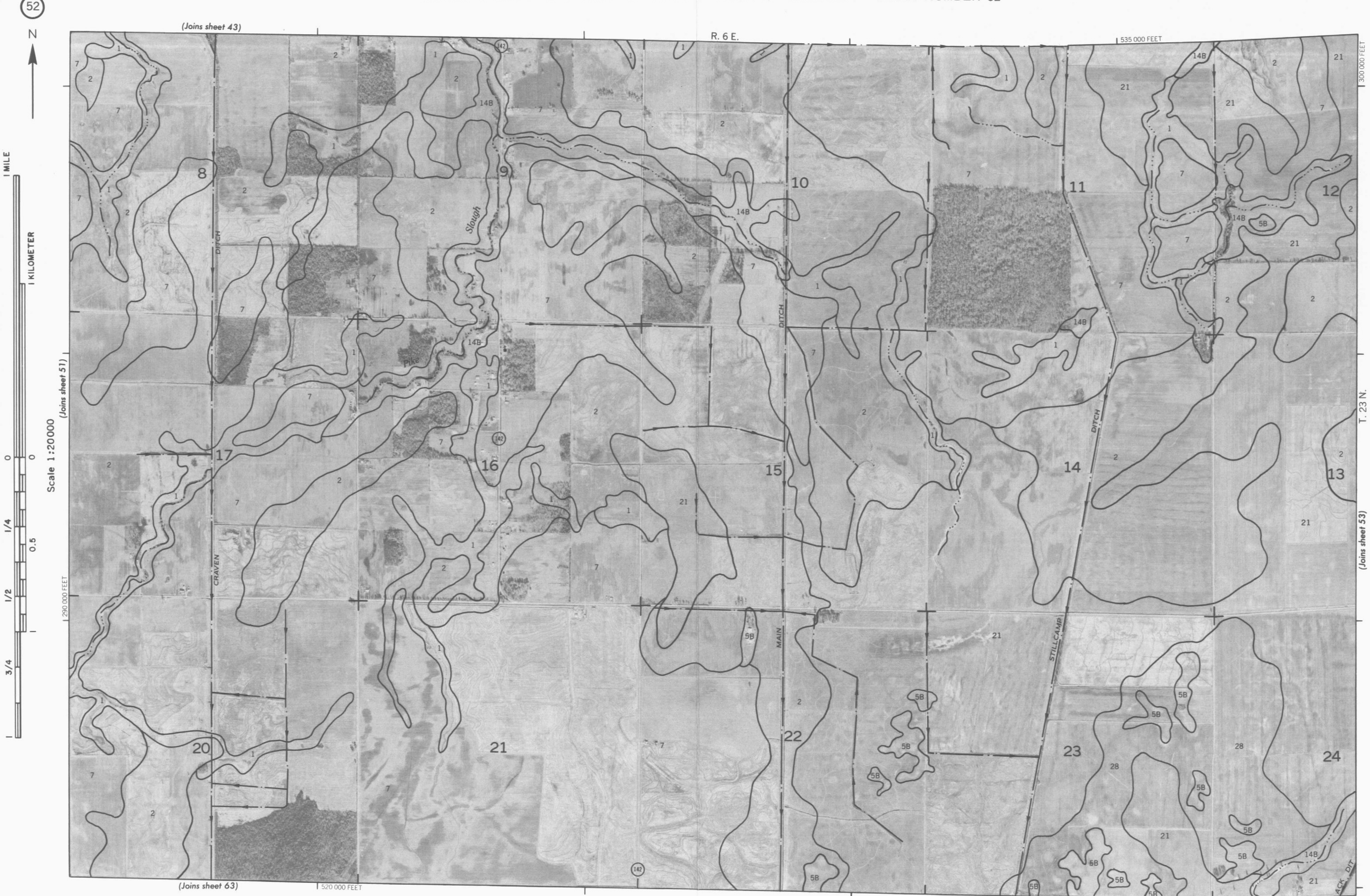
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 50



BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 51

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 53

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 54

54

N

Scale 1:20000

1 MILE

1 KILOMETER

(Joins sheet 45)

(Joins sheet 53)

(Joins sheet 65)

(Joins sheet 55)

R. 7 E. | R. 8 E.

T. 23 N.

585 000 FEET

300 000 FEET

285 000 FEET

565 000 FEET

BLACK RIVER

DITCH

Nysaa

water

Slough

Menorkenut

DITCH NO. 33

DITCH NO. 32

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 54

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 55

55

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 55

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 46)

590 000 FEET

R. 8 E. | R. 9 E.

300 000 FEET

T. 23 N.

(Joins sheet 54)

(Joins sheet 66)

605 000 FEET

285 000 FEET

N

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 56

56

N

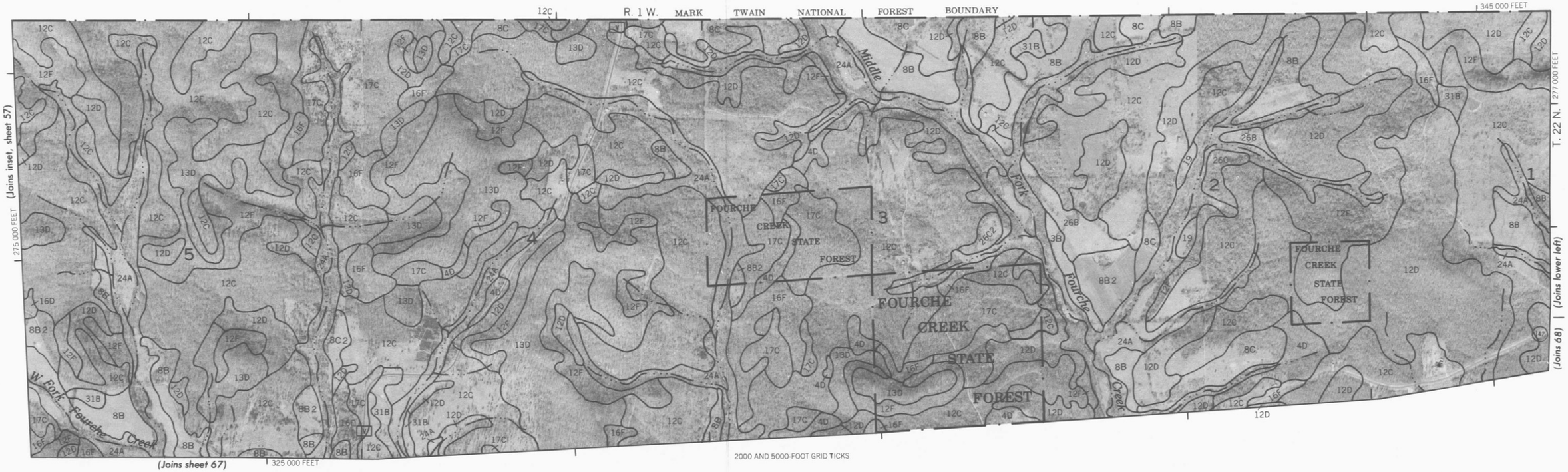
1 MILE

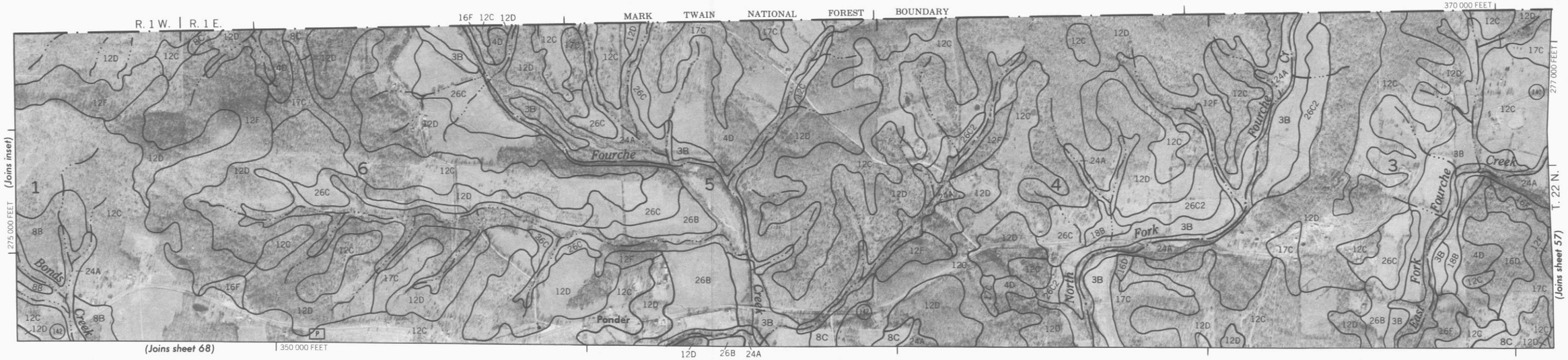
1 KILOMETER

0 1/4 1/2 3/4 1

0 0.5

Scale 1:20000





This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 56

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 57

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

375 000 FEET | R. 1 E. | R. 2 E. | (Joins inset B, sheet 66)

285 000 FEET

278 000 FEET

MARK TWAIN NATIONAL FOREST BOUNDARY

T. 22 N.

(Joins inset, sheet 56)

275 000 FEET

317 000 FEET

(Joins inset B, sheet 28)

R. 1 W.

320 000 FEET

3000 FOOT GRID TICKS

T. 23 N.

(Joins sheet 56)

(Joins sheet 58)

(Joins sheet 69)

395 000 FEET

57

N

1 MILE

1 KILOMETER

Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 58

59

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 59

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 6

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 60

60

N

R. 3 E. | R. 4 E. (Joins sheet 49)

T. 22 N. | T. 23 N.

(Joins sheet 61)

(Joins sheet 59)

(Joins sheet 72)

465 000 FEET

445 000 FEET

285 000 FEET

275 000 FEET

Scale 1:20000

1 MILE

1 KILOMETER

0 0.5 1

1/4 1/2 3/4

Cypress Creek

Logan Caldwell Creek

Black Little Run

Buzzard River

Mo-Ark Camp

RAILROAD

DITCH NO. 2

Oxly

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 60

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 61

61

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 61

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

470 000 FEET

R. 4 E. | R. 5 E.

(Joins sheet 50)

285 000 FEET

T. 22 N. | T. 23 N.

(Joins sheet 60)

(Joins sheet 62)

(Joins sheet 73)

270 000 FEET

490 000 FEET

N

Scale 1:20000

1 MILE

1 KILOMETER

0 0 1/4 1/2 3/4 1 0.5

Rattlesnake Knob

Parks

Black River

Gaines Slough

Little

Naylor

RIPLEY COUNTY

BUTLER COUNTY

Taft Ridge

Mackintosh Ridge

Brown Ridge

Harris Ridge

Harviell Ridge

Jennings Ditch

Cypress Ditch

Big Sink

Hart Ditch

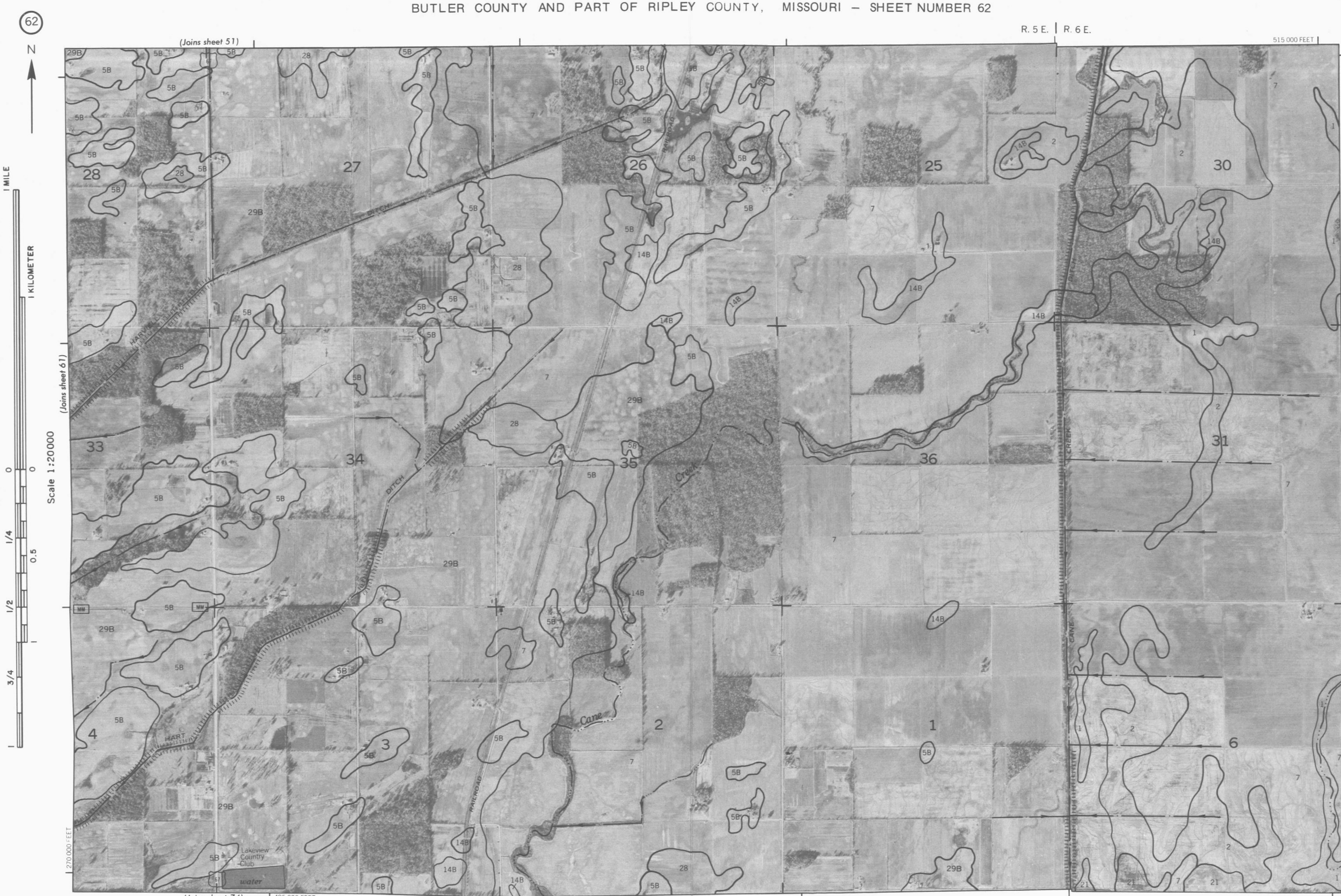
Ditch

Water

NO. 2

25 26 27 28 29 30 31 32 33 34 35 36

1 2 3 4 5 6



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

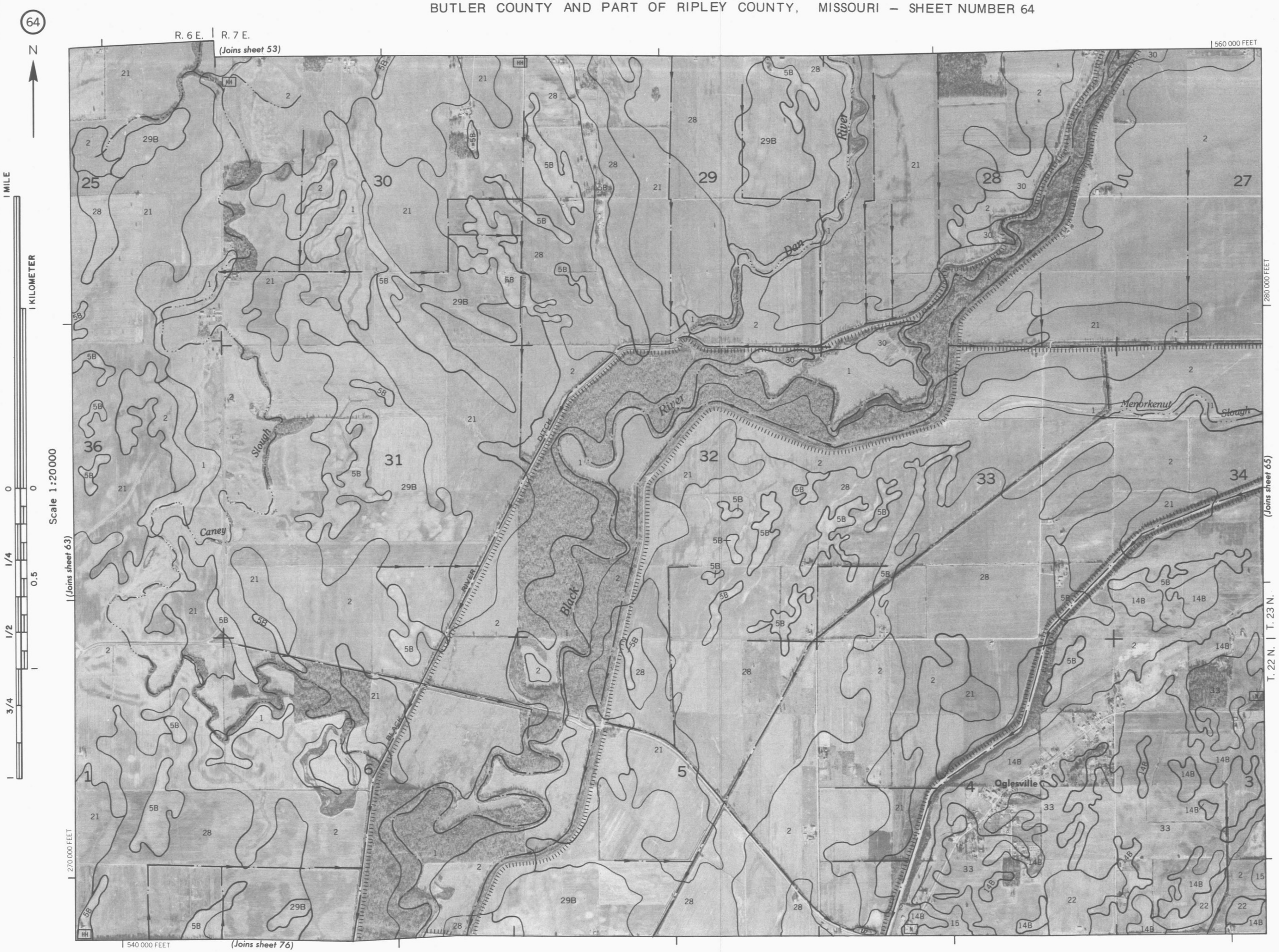
BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 62

63

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 63

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 64



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 64

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 65

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 65

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

R. 7 E. | R. 8 E.

565 000 FEET

(Joins sheet 54)

280 000 FEET

T. 22 N. | T. 23 N.

(Joins sheet 64)

(Joins sheet 66)

270 000 FEET

580 000 FEET (Joins sheet 77)

65

N

1 MILE

1 KILOMETER

0 0 1/4 1/2 3/4 0.5

Scale 1:20000

water

Slough

Menorkenut

RIDGE

MELVILLE

DITCH

NO. 22

DITCH

NO. 31

DITCH

RIVER

CACHE

Qulin

Osborn

66

N

Scale 1:20000

1 MILE

1 KILOMETER

0 0 1/4 0.5 1/2 3/4 1

(Joins sheet 55)

R. 8 E.

605 000 FEET

280 000 FEET

(Joins sheet 65)

270 000 FEET

(Joins inset, sheet 6)

DITCH NO. 22

DITCH NO. 31

DUNKLIN CO

River

St. Francis

DUNKLIN COUNTY

NO. 30

DITCH

Osborn

INSET A

R. 8 E. 587 000 FEET

255 000 FEET

T. 22 N.

(Joins sheet 77) 253 000 FEET

(88)

DUNKLIN

COUNTY

St. Francis River

585 000 FEET

2000 FOOT GRID TICKS

INSET B

MARK TWAIN NATIONAL FOREST BOUNDARY

R. 2 E.

395 000 FEET

290 000 FEET

Briar Creek

PINE HILL HOLLOW

(Joins sheet 57)

385 000 FEET

2000 AND 5000-FOOT GRID TICKS

T. 22 N. | T. 23 N.

T. 23 N.

(Joins sheet 47)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 66

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 67

67

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 67

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

325 000 FEET

270 000 FEET

T. 22 N.

R. 1 W.

(Joins inset, sheet 56)

(Joins inset B, sheet 28)

(Joins sheet 79)

(Joins sheet 68)

(Joins sheet 78)

345 000 FEET

260 000 FEET

Gatewood

West Fork

Middle Fork

Fourche Creek

Tucker

FOURCHE HILL CREEK STATE FOREST

MULVINIA LOOKOUT TOWER

N

1 MILE

1 KILOMETER

0 0

1/2 1/4 0.5

3/4

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 68

68

N

R. 1 W. | R. 1 E.

(Joins sheet 56)

(Joins sheet 67) | (inset,sh 56)

370 000 FEET

270 000 FEET

T. 22 N.

260 000 FEET

350 000 FEET

(Joins sheet 79)

(Joins sheet 69)

Scale 1:20000

1 MILE

1 KILOMETER

0 0 1/4 0.5 1/2 3/4 1

Bonds Creek

Haygood Creek

West Fork Fourche Creek

North Fork Fourche Creek

East Fork Fourche Creek

Fourche Creek

Leibig

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 68

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 69

69

N

375 000 FEET

R. 1 E. | R. 2 E.

(Joins sheet 57)

270 000 FEET

T. 22 N.

(Joins sheet 68)

(Joins sheet 70)

260 000 FEET

390 000 FEET

(Joins sheet 80)

Mulberry Creek

McKinney Creek

Mill Creek

Hurricane Creek

CORRECTION LINE

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 69

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 7

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 7

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

445 000 FEET

380 000 FEET

R. 4 E.

(Joins sheet 1)

T. 25 N. | T. 26 N.

CARTER COUNTY

MARK TWAIN NATIONAL FOREST

29 28 27 32 33 34 5 4 3

Tommie Creek

BEEHOLE HOLLOW

NUBBIN HOLLOW

Harmon Branch

(Joins sheet 8)

(Joins sheet 14)

465 000 FEET

365 000 FEET

7

N

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1/4 1/2 3/4 1

70

N

1 MILE
1 KILOMETER
Scale 1:20000
0 1/4 0.5 1/2 0 3/4 1

25 (Joins sheet 58) 8C2 R. 2 E. | R. 3 E. 420 000 FEET

260 000 FEET

270 000 FEET

T. 22 N.

(Joins sheet 69)

(Joins sheet 71)

395 000 FEET (Joins sheet 81)

Current River
Beaucamp Creek
Mill Creek
Dudley Creek
Island
Wolf Creek
Hurricane Creek
Wells Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 70

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 71

71

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 71

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

R. 3 E.

T. 22 N.

425 000 FEET

270 000 FEET

255 000 FEET

440 000 FEET

(Joins sheet 59)

(Joins sheet 70)

(Joins sheet 72)

(Joins sheet 82)

TURKEY PEN HOLLOW

Harris Creek

Harris Creek

Logan Creek

Black Little R

N

1 MILE

1 KILOMETER

Scale 1:20000

0 0.5 1/4 1/2 3/4

72

N

(Joins sheet 60)

R. 4 E.

465 000 FEET

Naylor

RAILROAD

Logan Creek

Black River

SEWELL BRIDGE

Little Logan Creek

Logan Ditch No. 2

Hemenway

RIDGE

SYLVAN

Torch

T. 22 N.

265 000 FEET

255 000 FEET

445 000 FEET

(Joins sheet 71)

(Joins sheet 73)

(Joins sheet 83)

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1

1/4 1/2 3/4

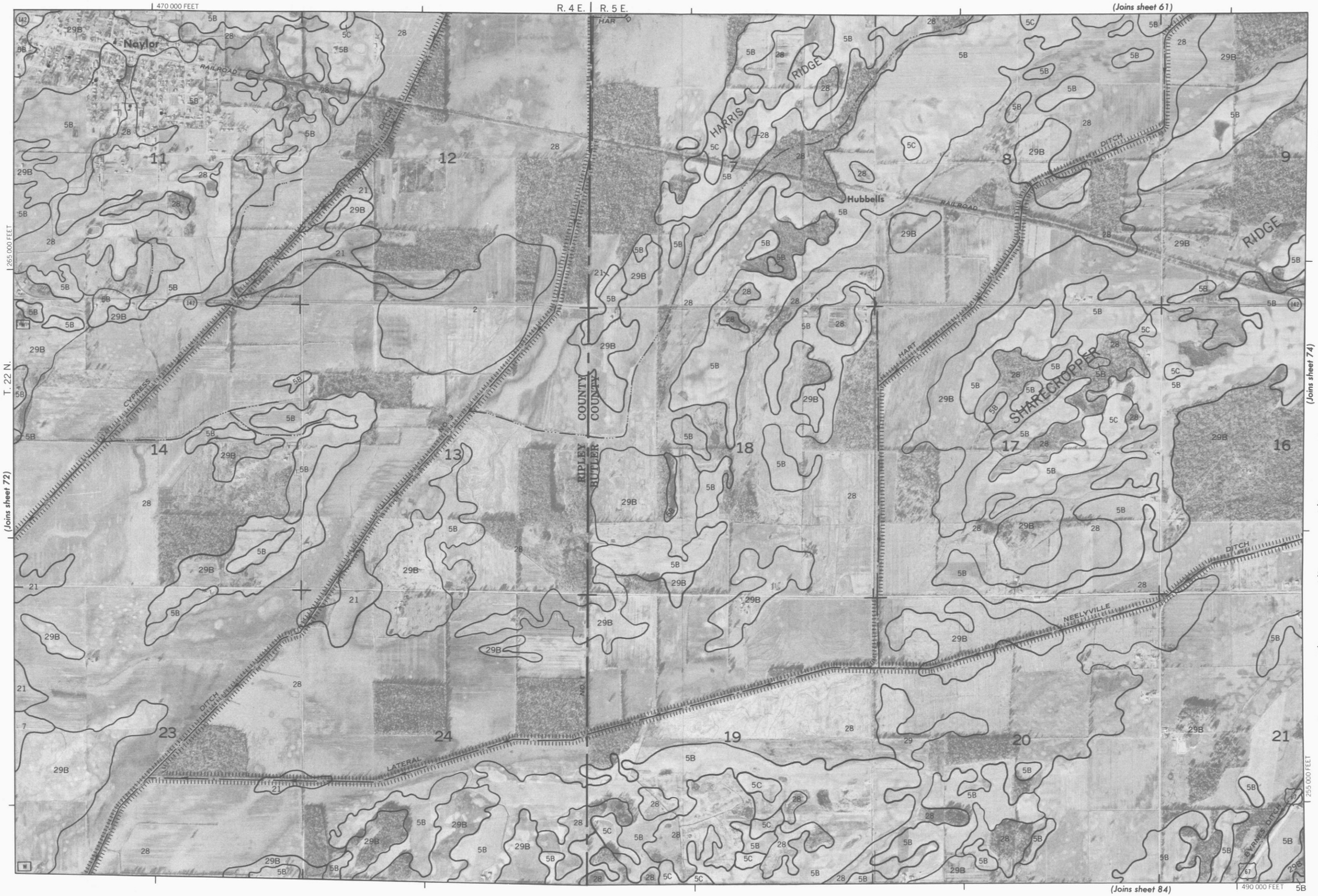
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 72

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 73

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 73

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



73

N

1 MILE
1 KILOMETER
0
0
1/4
1/2
3/4
0.5

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 74

74

N

R. 5 E. | R. 6 E.

515 000 FEET

265 000 FEET

T. 22 N.

(Joins sheet 62)

(Joins sheet 73)

(Joins sheet 75)

(Joins sheet 85)

495 000 FEET

Neelyville

Airstrip

RAILROAD

DITCH

Creek

CANE CREEK

1 MILE

1 KILOMETER

Scale 1:20000

0 1/4 0.5 1/2 1 3/4 1

This map is compiled on 1973 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 74

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 75

75

N

520 000 FEET

R. 6 E.

(Joins sheet 63)

265 000 FEET

T. 22 N.

(Joins sheet 74)

(Joins sheet 76)

535 000 FEET

(Joins sheet 86)

BIG CANE STATE FOREST

Vastus

Hunting Slough

Big Slough

Little Hunting Slough

DITCH

MAIN DITCH

STILLCAMP

ACKERMAN

1 MILE

1 KILOMETER

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 75

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

76

N

R. 6 E. | R. 7 E. (Joins sheet 64)

560 000 FEET

265 000 FEET

T. 22 N.

(Joins sheet 77)

255 000 FEET

540 000 FEET

(Joins sheet 87)

Scale 1:20000

1 MILE

1 KILOMETER

0 0 1/4 0.5 1/2 3/4 1

(Joins sheet 75)

Carola

Black River

Black River

Gills Bluff

Swan Pond Ditch

Ditch

Pumping Station

Gaging Station

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 76

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 77

77

N

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 77

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

565 000 FEET

R. 7 E. | R. 8 E.

(Joins sheet 65)

265 000 FEET

T. 22 N.

(Joins sheet 76)

580 000 FEET (Joins sheet 88)

(Joins inset A, sheet 66) DUN CO

(Joins inset, sheet 6)

255 000 FEET

St. Fran

1 MILE

1 KILOMETER

0 1/4 1/2 3/4 0

0.5 0

Scale 1:20000

DITCH

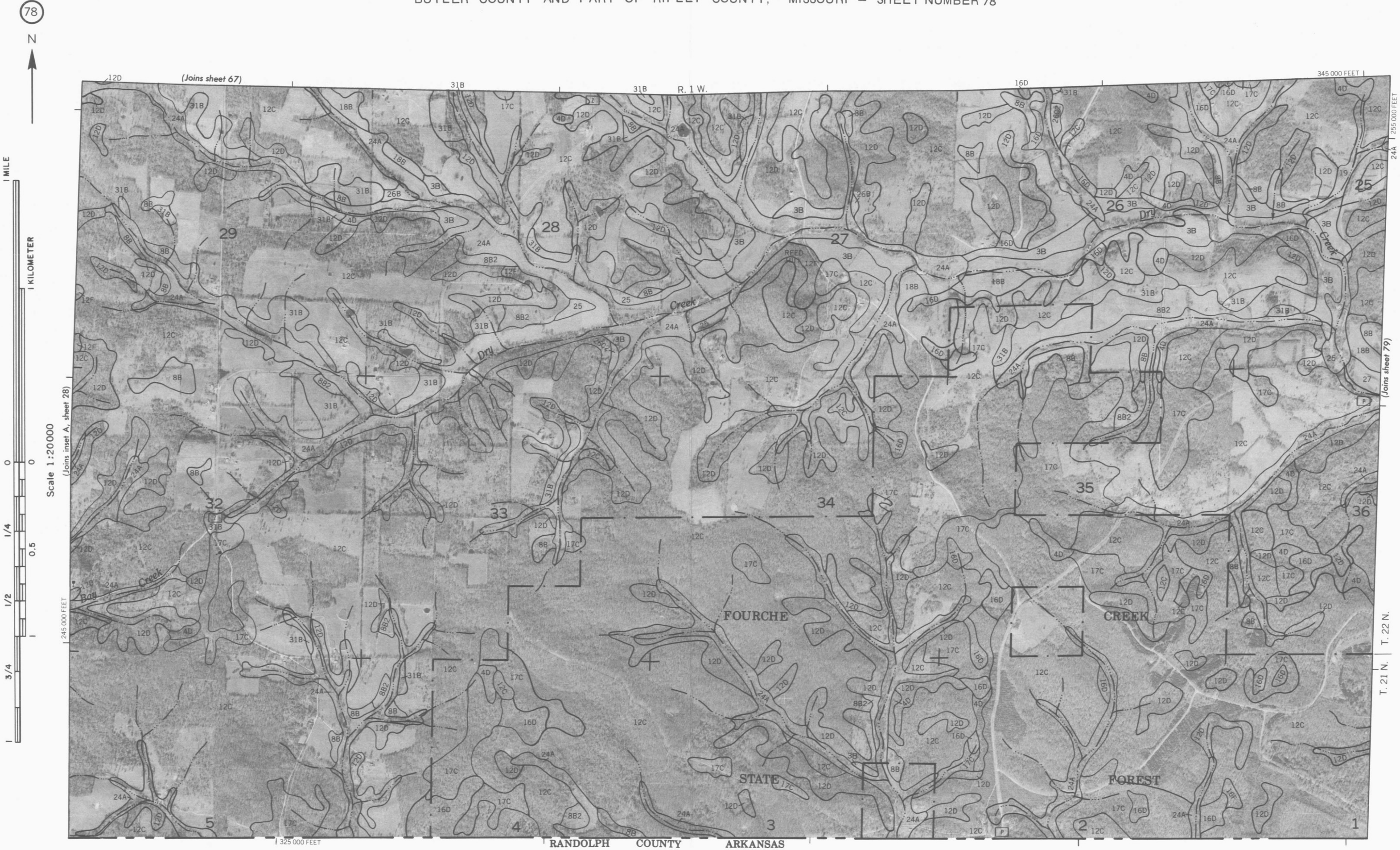
RIVER

CACHE

NO. 30

NO. 37

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 78



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 78

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 79

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

R. 1 W. | R. 1 E.

350 000 FEET

255 000 FEET

(Joins sh 78) | (Joins sh 67)

(Joins sheet 68)

(Joins sheet 80)

T. 22 N.

T. 21 N.

365 000 FEET

RANDOLPH COUNTY ARKANSAS

N

1 MILE

1 KILOMETER

Scale 1:20000

0 0 0.5 1/4 1/2 3/4

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 8

8

N

1 MILE

1 KILOMETER

0 0

Scale 1:20000

1/4 0.5 1/2 0 3/4 1

R. 4 E. | R. 5 E.

490 000 FEET

380 000 FEET

T. 25 N. | T. 26 N.

365 000 FEET

470 000 FEET

(Joins sheet 2)

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 15)

MARK TWAIN NATIONAL FOREST

Blue Hole Hollow

Grassy Hollow

Cane Creek

Goose Creek

Mallady Hollow

water

PP

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 8

80

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 80

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 81

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 81

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

395 000 FEET

255 000 FEET

R. 2 E. | R. 3 E.

(Joins sheet 70)

(Joins sheet 80)

(Joins sheet 82)

T. 22 N. | T. 21 N.

RANDOLPH COUNTY ARKANSAS

CLAY COUNTY ARK.

245 000 FEET

415 000 FEET

Hurricane Creek

Wells Creek

Pratt Creek

Logan Creek

Eagan Creek

Eagan Branch

Everett Creek

Glaize Creek

Davis Creek

CURRENT RIVER

FOURCHE CREEK STATE FOREST

Current View

81

N

1 MILE

1 KILOMETER

0 0

1/4 0.5

1/2

3/4

Scale 1:20000

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 82

82

N

Scale 1:20000

1 MILE

1 KILOMETER

0 1/4 0.5 1/2 3/4 1

(Joins sheet 71)

R. 3 E.

440 000 FEET

250 000 FEET

245 000 FEET

420 000 FEET

(Joins sheet 81)

(Joins sheet 83)

T. 21 N | T. 22 N.

CLAY COUNTY ARKANSAS

Purman

BETHEL BRIDGE

Deer Lick Creek

Black River

Little

NO. 2 DITCH

CYPRESS DITCH

Sinsabaugh

20 21 22 23 24 25 26 27 28 29 32 33 34 35 36 5 4 3 2 1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 82

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 83

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

83

N

445 000 FEET

R. 4 E.

(Joins sheet 72)

250 000 FEET

T. 22 N.

(Joins sheet 82)

(Joins sheet 84)

245 000 FEET

465 000 FEET

Glenn

DITCH

CYPRESS

BUNCOMB

1 MILE

1 KILOMETER

Scale 1:20000

CLAY COUNTY ARKANSAS

84

N

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 84

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 85

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 85

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

86

N

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

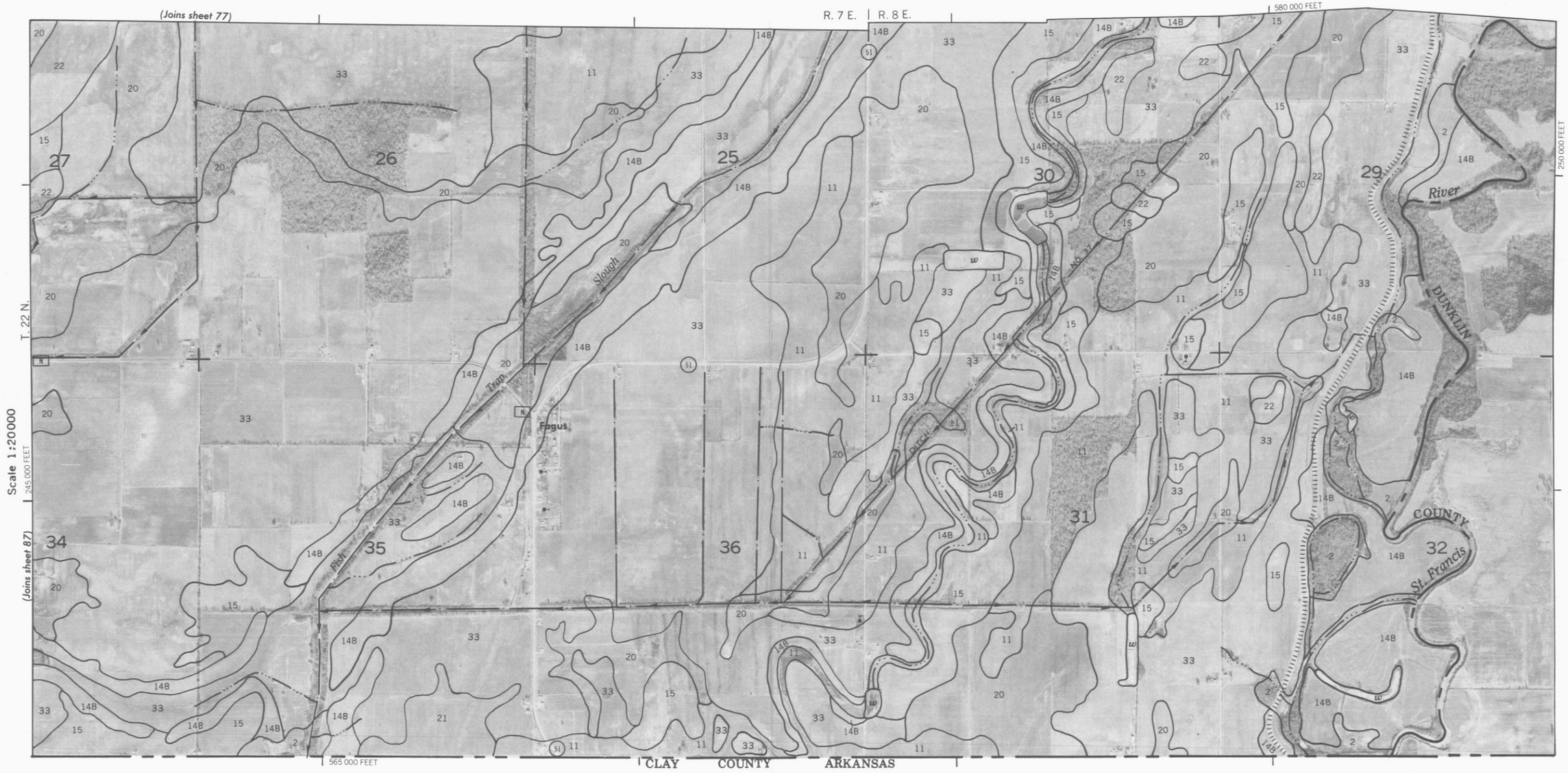
BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 86

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 87

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 87

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI – SHEET NUMBER 88



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 88

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI — SHEET NUMBER 9

BUTLER COUNTY AND PART OF RIPLEY COUNTY, MISSOURI NO. 9

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

9

N

R. 5 E. | R. 6 E.

T. 25 N. | T. 26 N.

495 000 FEET

380 000 FEET

370 000 FEET

515 000 FEET

(Joins sheet 3)

(Joins sheet 8)

(Joins sheet 10)

(Joins sheet 16)

MARK TWAIN NATIONAL FOREST

BLACK RIVER

RAILROAD

Creek

Goose Creek

Aldridge Creek

Hartman Creek

Willow Creek

water

1 MILE

1 KILOMETER

Scale 1:20000